



FRIDAY, JUNE 10.

NEWS OF THE WEEK.

We give below, in a condensed form, the leading news items of the week. These items will be found in detail in their appropriate columns.

Meetings next week.—Cumberland & Piedmont; Ogdensburg & Lake Champlain.

Elections.—Billings, Clark's Fork & Cooke City, C. F. Roberts, President.—Chicago & Northwestern, Marvin Huggitt, President.—Chicago, St. Paul & Kansas City, Raymond Du Puy, General Manager.—Louisville Southern, J. G. Mortley, Chief Engineer.—Mobile & Birmingham, E. B. Thomas, General Manager.—Southern Ohio River, Horace Scott, President.—South Pacific Coast, James G. Fair, President.—Terre Haute & Indianapolis, Henry S. Ives, President.

New Companies Organized.—Consolidated Transit Co. obtains charter in Philadelphia.—Denver, Garden City & Southeastern obtains charter in Kansas.—Denver Junction, McAllister & Southeastern obtains charter in Kansas.—Fall River, Howard & Western incorporated in Kansas.—Fort Smith, Howard & Northwestern is incorporated in Kansas.—Garden City Nickel Plated is chartered in Kansas.—Havana, Vermont & Western files articles in Illinois.—Hickory Valley is incorporated in Pennsylvania.—McPherson, Texas and Gulf is chartered in Kansas.—Midland & Western obtains charter in Kansas.—Midland, McPherson & Northern obtains charter in Kansas.—New York, Wheeling, St. Louis & Chicago is a new consolidation of two companies.—Oxford & Kansas files articles in Nebraska.—Pekin & Danville files articles in Illinois.—Pittsburgh, Fort Scott & Chicago is incorporated in Kansas.—St. Louis, Alton & Springfield files articles in Illinois.—St. Paul, Glenwood & Hay River files articles in Wisconsin.—South Pacific Coast, new consolidated company, files articles in California.

Changes and Extensions.—Alabama: Kansas City Memphis & Birmingham begins tracklaying at Cordova.—Montgomery & Alabama is completed 50 miles from Montgomery.—Arkansas: Little Rock, Mississippi River & Texas is to be completed from Warren to Camden.—California: Southern Pacific completes surveys from Santa Ana to San Diego.—Georgia: Birmingham & Atlantic Air Line is to be extended from Macon to Savannah.—Iowa: Chicago, Milwaukee & St. Paul opens Sioux City and Yankton extension.—Louisiana: Shell Beach road is completed from New Orleans to Point-a-la-Hache.—Michigan: Toledo, Ann Arbor & North Michigan begins work on extension to Cadillac.—Montana: Drummond & Phillipsburg is graded for 10 miles.—Ohio: Toledo, St. Louis & Kansas City will change 167 miles to standard gauge.—Texas: San Antonio & Aransas Pass is completed to Colorado River from San Antonio.—Washington Territory: Northern Pacific, Cascade Division is completed.—Wisconsin: Milwaukee, Lake Shore & Western is preparing to build from Wausau to La Crosse.

Earnings.—Twenty-one roads report gross earnings for May, 19 showing an increase for the month and 2 a decrease.

Traffic.—Anthracite coal shipments for the week ending June 4 show an increase of 10.8 per cent. as compared with corresponding week last year; bituminous shipments show increase of 56.4 per cent.; coke, for week ending May 28, shows decrease of 81.0 per cent. Cotton movement, interior markets, for week ending June 7, shows a decrease of 23.0 per cent., as compared with corresponding period last year; shipments show decrease of 52.3 per cent.; seaport receipts, decrease of 61.6 per cent.; exports, a decrease of 88.1 per cent.; cotton in sight is less than at same date last year by 38.3 per cent.

Leases and Sales.—Cincinnati, Hamilton & Dayton obtains control of the Terre Haute & Indianapolis.—Pittsburgh & Western is sold.

Miscellaneous.—Trial of car couplers in New York City.

Contributions.

Electricity and Train Brakes.

CHICAGO, Ill., June 2, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The experiments with electricity in the application of the brake, which have been made at the recent Burlington brake trials, have not only demonstrated that an electric attachment would be a handy thing for emergency stops and for graduating the brakes on an incline, but they have also fully demonstrated that the electric current cannot be depended upon for controlling freight trains in regular business in the present state of the art. Most practical railroad men are already familiar with the great difficulty attending upon the operation of the telegraph instruments located in an office and protected as much as possible from dust and from shocks, and know that even there the magnets and the binding screws need constant attention of the minutest kind; so it would be unreasonable, in the present state of our knowledge, to believe that even the two or three electric valves which Westinghouse suggests, to be used in addition to his triple valves, could be certainly depended upon, although useful when the current circulates; yet this is the simplest form of electrical application which was shown at Burlington, and is the only one which did not fail at some time during the trials. The permanence or certainty of an

electric contact is the most difficult thing to insure in any of the various uses to which electricity has been applied.

No doubt your readers have examined with interest your description and illustrations of the Carpenter electric brake as applied to the 50-car train at the recent trials, and those who understand the difficulty of maintaining an electric circuit will have already anticipated some of the complications which render it entirely impracticable. For, if a practical man must express doubts as to the reliability of even the simple electrical arrangements on the Westinghouse train, what shall he say to the extreme of complication in the Carpenter brake?

An examination of the drawings, which you published, shows that there are four electric bobbins on each car, forming two electric magnets, or 200 bobbins constituting 100 electric magnets, and six electric contacts at the couplings of each car, making 300 coupling contacts on one such train. Each one of these magnets operates an armature, attached to which is a valve intended to open or close a one-eighth inch opening. Each of these valves and armatures is normally held to its seat and away from the magnet by a small spring fitted over a screw, set into the base piece, to which the electro-magnets are fitted. On a 50-car train these 100 small valves release the air from 100 small diaphragms, and each of these diaphragms operates its particular air valve. To insure motion both ways, each of the diaphragms has a small air passage drilled in its stem for equalizing the pressure on its two sides; there are, therefore, on a 50-car train, 100 such small air passages. In the event of a piece of dirt or other substance getting under any one of these 100 small valves, or the 100 other valves, an improper action is likely to take place; or in the event of any one of the 100 small holes in the diaphragm stems being clogged, the valves will also operate improperly. Again, the failure of a wire or any one of the electro-magnets may also cause one or the other of the four valves or two diaphragms of that car to operate improperly, or a failure of any one of the 300 electric contacts will derange the action of all the apparatus beyond it. Now, will you tell a plain railroad man, in the event of a failure, to which one of these 300 contacts, 100 screws, 100 springs, 100 small valves, 100 small diaphragms, or 100 other valves he should go to find out what's the matter, when the brake does not work?

An incident which produced, perhaps, as great an impression as any other at the Burlington trials was the failure of the electric current to act on the Carpenter train immediately after a satisfactory stop had been made by the use of the electric apparatus. After much doubt and search, it was found that only a binding screw had become loosened, and causing an almost complete failure of the brake to operate, obliging the engineer to call for hand brakes; showing what every practical man already knew, that one poor contact might derange the whole apparatus. This train was night and day, hourly and momentarily, in the hands of able and watchful electrical experts; what would a practical man anticipate as the result of confiding such a multitude of delicate contrivances to an ordinary train crew? That the thing would not work after the first change of engines! I answer my own question, for I am a PRACTICAL MAN.

The Lesson of the Accident at the Horseshoe Curve.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The recent accident on the Pennsylvania Railroad near the Horseshoe Curve, in which a derailed freight car was thrown across the track of an express passenger train bound in the opposite direction, may in one sense be said to be due to double track, but it is well to bear in mind that it is one of the few disadvantages caused by double track, while the increased safety gained is enormous. Cases of one train being derailed by the breakage of a wheel, an axle or any other part on a train proceeding in an opposite direction on the other track are very rare and are enormously outnumbered by the butting collisions which are so inseparably connected with single track working.

The real moral of the accident is that wheels and axles should be made of better material and more of it used. The wheels and axles of our freight cars are lighter than those used in any other part of the world and are more heavily laden, while it is open to question whether they are not made of worse material. I say "wheels and axles," because I understand that the accident on the Pennsylvania was caused by the breakage of an axle. The miserably small axles often found under heavily laden freight cars must result in an immense number of breakages. Unfortunately each railroad keeps the record of its failures as a profound secret. Were notes compared some astounding differences would be found, and many unsuspected weak points would be discovered.

It is a pity that some general law cannot be passed for the whole country, obliging all railroads to make an accurate return of all serious accidents on their road, collisions, derailments and breakages of wheels and axles while running and the failure of bridges, tunnels and embankments when of such a nature as to unexpectedly prevent the passage of trains. If the number of these accidents were known and the figures analysed, we might expect to find out where small axles passed the danger line, and might also learn something as to the risk of using cheap car wheels; but at present we are much in the dark on the subject, especially on small roads. The great divergence of opinion expressed on these and similar points at meetings of the Master Car-Builders' Club, etc., show the need of accurate and comprehensive statistics on the point.

If in addition to such a law requiring railroads to make returns it would be possible that all important accidents in which the exact cause was obscure should be investigated by the state railroad commissioners or by one or more experts much would be gained. These experts should be specially

appointed, and their post should be permanent and their emoluments sufficiently ample to enable good men to be secured and render them independent of big railroad corporations. These experts should have no power to enforce obedience to any recommendations that they might make, as that would involve a division of responsibility with the railroad, where it properly belongs. The experts should merely have power to compel the attendance of witnesses and the production of necessary documents and other evidence. The evidence they obtain should be printed and illustrated where necessary and sold to the general public at a cheap rate. We should then have the light of publicity thrown on these disasters and revelations would have more effect in producing reforms than any amount of legislation, which is often inspired more by zeal or less creditable motives than it is tempered by discretion.

The only objection that I know to such a plan is that it is "English, you know," being practically a reproduction of the railway department of the British Board of Trade. Their power of inquiry into accidents and publishing the evidence with drawings where necessary has proved of immense service in lessening the number of accidents in spite of a great increase in the number and speed of trains. Many American railway men believe that the Board of Trade can order and enforce changes in the working of a road, but this is not the case. The inspectors can criticize and report anything that comes up in the evidence and suggest certain improvements, but it is for the management of the road to adopt or reject this advice. The responsibility rests altogether with the railroad, and if they reject well-meant advice and another accident follows an intelligent jury note the fact when called upon to decide whether negligence has or has not been shown and assess damages accordingly. The Board of Trade have no compulsory powers over open lines, but simply show on the best evidence how and why the accident occurred.

The Railroad Commissioners of some states fulfill the same mission here, but in only a few states do the commissioners make any effective inquiry into the causes of serious accidents, and their tenure of office is so uncertain that they have to leave just as they have acquired sufficient knowledge to be useful. Newspaper reports of accidents must necessarily be imperfect, and inquiries before a coroner's jury generally fail to get at the technical facts. Some better tribunal uniform in its methods throughout the whole country would do much useful work. K.

From London to Sweden and back in a Week.

LONDON, May 25, 1887.

TO THE EDITOR OF THE RAILROAD GAZETTE:

As you say in your issue of May 13, the present practice is so far settled as to the type that there is no danger of any large use of very bad rail sections. I think we may consider the subject almost exhausted for the present, and the engineers educated as far as type of rail section goes; but, keeping always before us as you say "the great importance of bringing up the weight of rail to the proper relation to the weight and speed of modern rolling stock," there is a great field open for further advances in safety as well as comfort. The English proverb says: "You must kill a king or a bishop before the railways will alter their plant," and will go out of their old groove, but perhaps this does not apply to America, where the people are more elastic and open for changes. But in Europe it is only too true, and I have no doubt it will require some radical causes before changes for the better will take place generally.

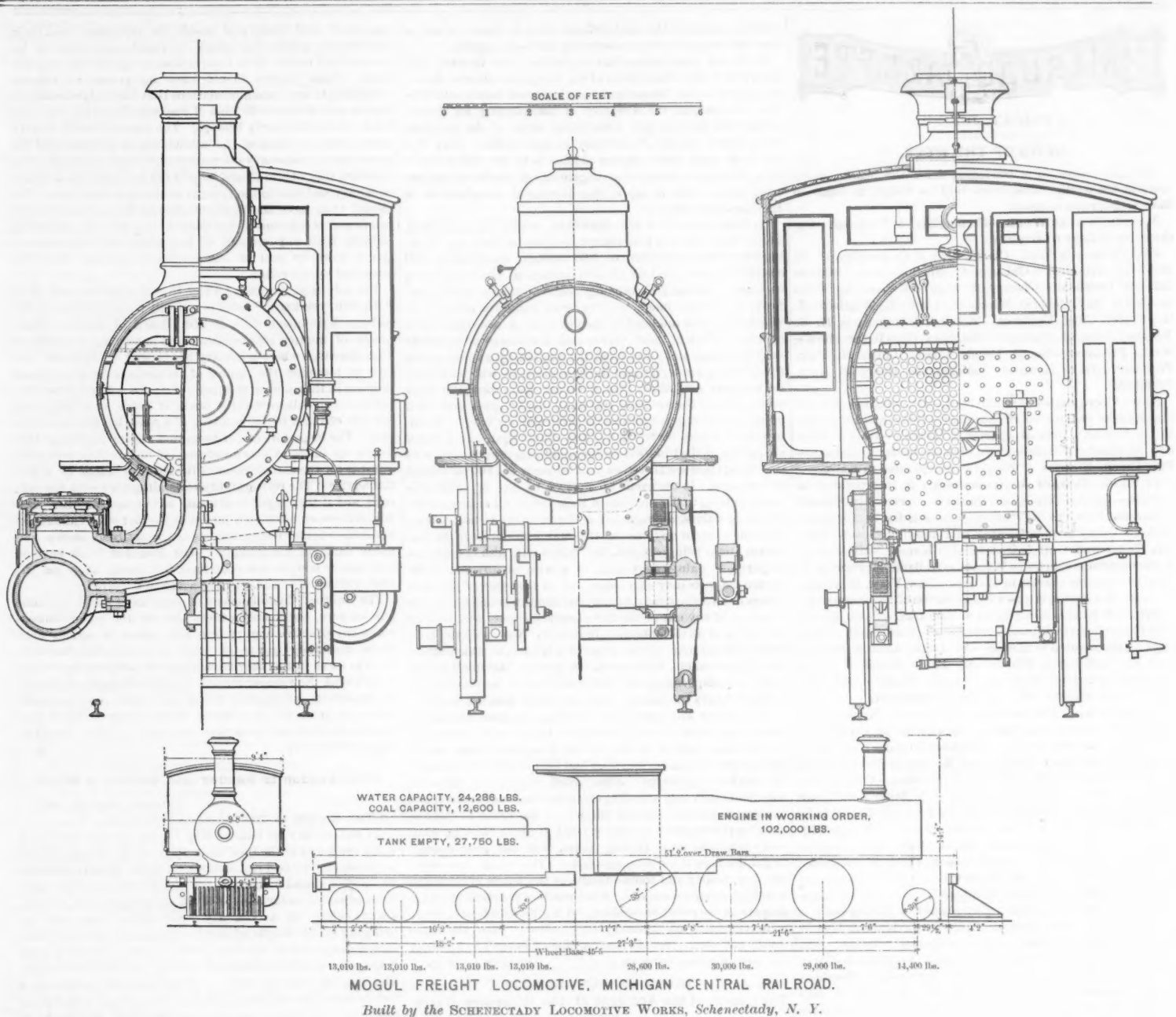
That a change is really wanted I can prove by the heading of this letter, as I made the journey on purpose to test how much shaking a man could stand in railway traveling in different countries of Europe. I started last week from London to Sweden, via France, Germany, Holland and Denmark, and back, but I must say my experience is a very unfavorable one to traveling civilization in the 19th century for, were I not blessed with a good strong constitution, I should not have stood it. Of all the railroads I passed on, the German were the worst for my inside, for I not only had a shaking up and down, but also sideways. I asked the guard if nobody else complained, he said "no."

Probably Bismarck would have laid his iron hand upon any one complaining of the Royal Administration of the state railways in Germany.

Technically speaking, the causes may not alone be attributed to the light weight of the rail—say 60 to 70 lbs. per yard, when it ought to be 100 lbs. for the rolling stock and speed to come up to English practice—but the carriages not being on the bogie system of America, but short and with very hard springs, is enough to make anybody break the journey as often as he can. I experienced the least shaking on the Dutch state railways, but there the rail is 80 lbs. per yard, and this is the more significant as they have the poor ballast of fine sand to contend with. Thus it appears the heavier the rail the less the shaking.

The change, coming back to England, and the ride in a good bogie carriage from Dover to London on the 85-lb. rails was a most pleasant sensation, and I am all the more convinced of the desirability of Continental roads coming up to the English standard of roads by employing the Goliath rail. This was the object of my paper last year, and the cause of the design of the Goliath section, for even with 100-lb. flange rail, the cost of rail would be less than with the English double head 80-lb. in a chair, and there is no reason why it should not be equally economical on many of the Continental roads with heavy traffic as well as safe for high speed, and it will, therefore, simply be a question of getting the engineers out of their old groove; but I am afraid this will not be accomplished in my lifetime.

Many engineers may say "what is the good of your showing me the most beautiful thing in the world if I have not got



the money to buy it?" and the argument is powerful enough with some; but, as the countries of Europe are chiefly laid with Government railways, and money is cheap enough, there might be some good done for mankind in the way of civilized railway communications, instead of taking all the funds to armies and navies to be wasted in bloodshed. At any rate, engineers in Europe shall not be wanting in knowing the truth about railway economy and comfort as I now think I have got hold of it, but it would be a very powerful assistance if engineers on your side would go before them; all the more so as rails are 50 per cent. dearer with you than with us, owing to the duty, which, however, does not make them any stronger. Looking back to the history of the Goliath, I can tell you that the writing of the paper, the designing of the section, the publication in four languages, all were comparatively very light work; but to get the Belgian government to adopt it, even for a trial, was worse, and so hard a work that I shall not venture to begin it again with any particular Government or railway company. All I can do is to let anybody have consultation for nothing, and appeal to the press to impress upon the public to force their respective countries and railway administrations, Government and private, to introduce improvements in the rail, which, as regards safety, economy, and comfort, would be worthy of the 19th century, and so end the centennial jubilees that are now going on in the form of "a jolly good shaking," to say nothing of running off the line and being killed. Now, as the proverb says, one must not only be hanged, but look pleasant over it.

C. P. SANDBERG.

Mexican Trade and Railroads.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Immediately on the understanding by the reactionary party of Mexico, the party which brought in Maximilian, that building railroads from the American border through Mexico meant the introduction of American men, customs, language and ideas, they instigated a fierce attack on the credit of all American enterprises in that country, in which they were ably seconded by the foreign merchants and financial interests there domiciled, and often also by visiting Americans, the intelligence of many of whom was only equalled by a distinguished Bostonian, who, being sent out to report on the resources of the country traversed by the Atchison, Topeka

& Santa Fe, came back prepared to prove "that the traffic of that desert region could never pay for the grease used on the axles of the cars."

The financial depression commencing with the death of President Garfield, preventing, as it did, the completion of trunk lines or feeders necessary to make the capital already invested remunerative, combined with the election of an inefficient President, where the chief executive is more influential than here, seemed for a time to justify the prediction so freely made in Mexico, and copied here, that the resources of the country were not equal to the support of railroads through it, and further, that there was a lack of financial honor on the part of its rulers which rendered any trust on their fiscal engagements extremely precarious.

But, notwithstanding the fact that the payment of the Mexican debt had once been submitted to a loosing arbitration of the sword, a result which is generally final, if not satisfactory, the Mexican Government has arranged with its creditors on a basis which would be liberal under any circumstances, and is now paying the interest promptly.

Nor was the financial depression, comparatively, at any time as severe in Mexico as in England, and the recovery has been more prompt, so that now the friends of that country see increasing traffic on its roads, new industries springing up with the extension of old ones, and simultaneously a returning confidence in the country's future, which has resulted in the reorganization of the Mexican National, and is furnishing money for its completion and for the construction of needed branches for the Mexican Central.

There will undoubtedly be depressions in Mexican enterprises in the future, but it is to be hoped that before another wave of depression arrives, in addition to the completion of the roads now entering the country, a road will be pushing into Central America as far at least as the projected Nicaragua Canal, if not to Panama.

N.

Charges for the Use of Freight Cars.

TO THE EDITOR OF THE RAILROAD GAZETTE:

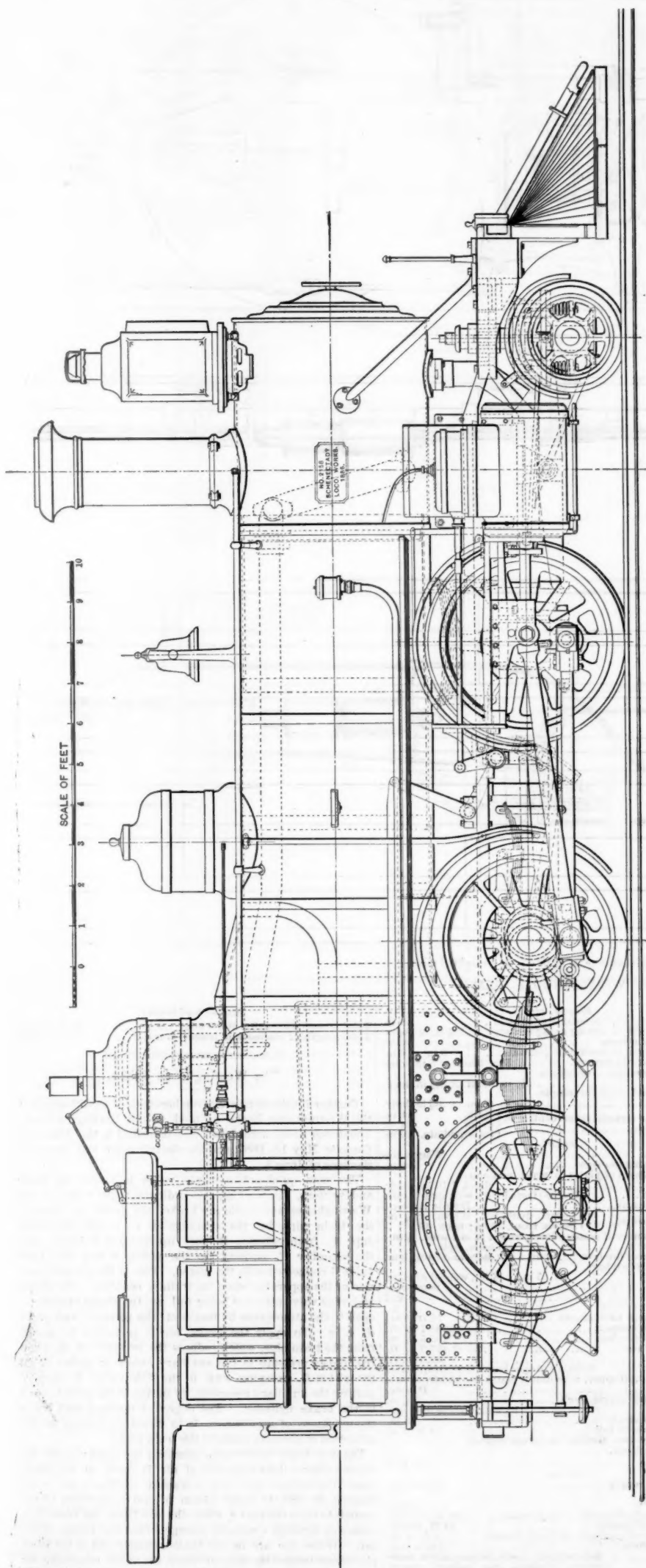
One of the unsolved problems in railroading is the question relating to the compensation to be allowed roads for cars that are detained on foreign roads beyond the period necessary to reach destination, unload and return. In other words, whether or not a per diem allowance should not be substituted

for an allowance based on the miles run. Under the present conditions, a car may leave its own road and not get back for weeks or months, yet may have only earned the mileage to and from the original point of destination, and in the meanwhile some road short of equipment has had the use of it for numerous trips on its immediate line. There have, however, been so many natural and proper causes for detention of cars, that many roads were fearful that a per diem charge would eventuate in much injustice. It is probable, however, that such causes would arise about equally on most roads that did not terminate at the seaboard. The termini of the latter, however, being the depots for the vast produce of the whole country, which does not flow in a steady stream, but fluctuates in accordance with supply and demand, must in the nature of things be overwhelmed with loaded cars, which cannot be promptly attended to, and in fact must often wait for days. Again, cars must often be held for the convenience of consignees. You say, why not charge them? And I say, if you do, another road will get your business. No road has ever succeeded in making anything by charging demurrage on cars detained because of the neglect of consignees to unload and take their goods away. Such action generally results in remitting amount of the demurrage.

Suppose a car is started from Chicago to New York over the Erie route, it would run smoothly over the Chicago & Atlantic, then over the New York, Pennsylvania & Ohio and finally over the Erie. Everything being in good condition, neither the two roads first named would have any extra per diem to pay, but Erie at her terminus, as shown above, might have considerable to pay, while only sharing in transportation charges pro rata per mile with the other roads. There is no good reason why the lines west connecting with the trunk lines should not share in paying any per diem charged for detentions beyond the control of the latter, in proportion to their earnings.

Again, the trunk lines are in the habit of sending cars into the West to wait for the movement of the crops, which are often detained days and sometimes weeks before loads are obtained. The roads where these cars are located in the meantime will not pay any per diem for such cars, nor should they be charged therefor. The cost in such cases should be shared by the beneficiaries—the roads running east to the seaboard.

Thus it will be seen that there is much difficulty to encounter



MOGUL FREIGHT LOCOMOTIVE, MICHIGAN CENTRAL RAILROAD.
Built by the SCHENECTADY LOCOMOTIVE WORKS, Schenectady, N. Y.

in adjusting per diem. If, however, approached in a proper spirit, there is no doubt that a system can be devised whereby a history of each car can be had from the time it leaves its own road till it returns, and rules determined upon whereby proper exceptions can be made from the per diem charge.

After so many years of talk upon this subject, it is gratifying to find that the Car Accountants' convention recently held at Atlanta, Ga., has made a recommendation for consideration of their superior officers, which, if not all it should be, may be the base of a permanent structure.

Their first and chief recommendation is, that the present mileage rate ($\frac{3}{4}$ cent) be reduced to $\frac{1}{2}$ cent per mile, and that a per diem of 15 cents be added. From what basis they arrived at these figures I am unable to say, but I do know that railroad men of large experience have concluded that $\frac{1}{2}$ cent per mile run is about the cost of repairs, and that 12 per cent. per annum on cost of the cars pays for interest on investment and depreciation—6 per cent. for each; 15 cents per diem is at the rate of 12 per cent. per annum on a car costing \$450. If, therefore, the recommendation is not based on such facts, it is a singular coincidence.

They also recommend that line cars shall not be subject to per diem charges except on roads not in the line. This, to some extent, would relieve the trunk lines on account of the detentions at their termini, since the bulk of through traffic is carried on in such cars, but would not relieve the roads in the West not in the lines, whereon cars await the movement of the crops.

A per diem rate is not to be allowed on cars belonging to private car companies. This is just for the reason that such cars, for the most part, are refrigerator cars substantially under the control of their owners, and consigned to themselves or their agents.

Under the present rate, and assuming that a car will average 30 miles a day continuously, its earnings per diem would be $22\frac{1}{2}$ cents, and under the new plan, 15 cents for mileage and 15 cents for time, its earnings would be 30 cents, or a little less, inasmuch as no time charge is made when a car is delivered and received back on the same day—line cars, of course, excepted.

All things considered, the car accountants have made a move in the right direction, and I trust that it may be acted upon by the higher officials of the respective roads, to the end that the abuse of using cars without compensation by non-owners may be stopped.

MAC.

Mogul Freight Locomotive, Michigan Central Railroad.

The accompanying engravings represent a class of Mogul engine that has been largely built by the Schenectady Locomotive Works for the Michigan Central and other roads.

Engines of this class are coming into favor on lines that have hitherto used only the American type, but the greater adhesion and cylinder power of the Mogul enables them to haul heavier trains and so perform more work than is possible with a four-coupled engine. While not so powerful as a Consolidation, a Mogul has a shorter wheel base, fewer parts and larger wheels, all features which conduce to reduce the expenses of repair and enable an engine to run freely. The greater distance between wheels also enables a direct acting driver brake to be applied to each wheel.

The engine is intended to burn bituminous coal, and the fire-box is placed wholly above the frame, and is thus limited in width only by the distance between the wheels instead of the distance between the frames. A large grate area is thus obtained, and even poor coal can be burnt without being lifted from the bars and carried away half burnt in the form of sparks. The rocking grate and hopper ash-pan enables the fire to be cleaned on the road. The ash-pan is not, however, provided with dampers to regulate the admission of air to the fire, an omission which is far too common.

Mr. C. E. Smart, the General Master Mechanic of the Michigan Central, informs us that the engine does not emit sparks, owing probably to the very large grate area. The fire is thin, but the effect of the blast being spread over so large an area does not lift the fire, as in smaller grates.

The ash-pan being a considerable distance above the rail level, these engines have been found to do remarkably well in snow, which cannot choke the ash-pan, as in engines with the fire-box between the frames.

On the Michigan Central it is found that the engine illustrated will, in actual practice, haul 10 more cars than an American type engine with 17×24 cylinders. The engine illustrated has taken 38 loaded cars up Kalamazoo grade, 5 miles, of 36.4 ft. per mile. The usual load on the Middle Division is, however, 37 cars.

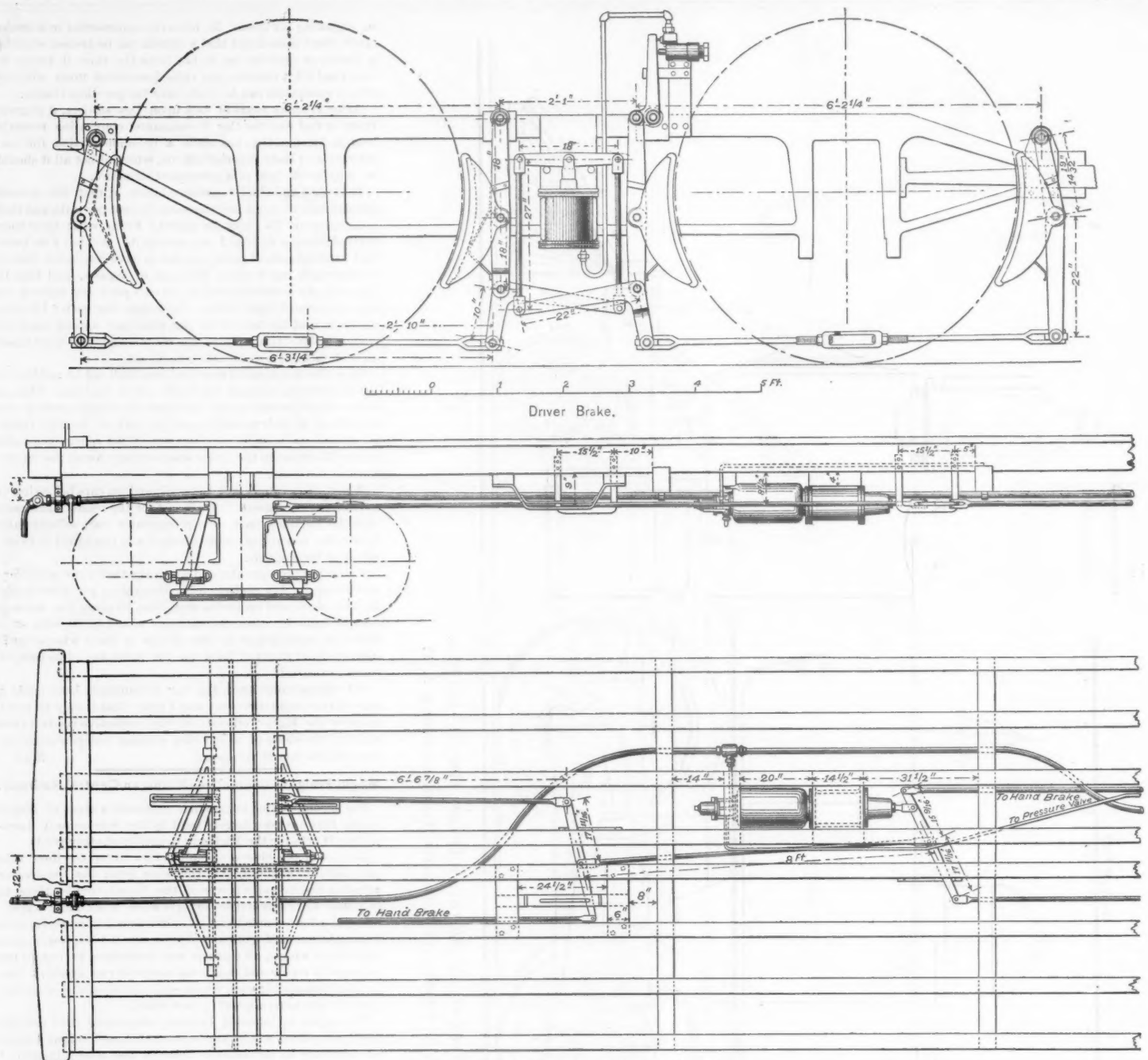
It may be useful to investigate the amount of work probably done by this engine in ascending the Kalamazoo grade with 38 loaded cars, though as no indicator diagrams have been taken, the calculation must be largely based on assumptions which may be more or less incorrect.

The average paying load on the Michigan Central was, according to the annual report for 1885 (the last published), 198.6 tons per train. Allowing 45 per cent. increase on this figure for the greater number of cars and the absence of empty cars on the train in question the paying load would be 290 tons, and the gross weight of the train would be about as follows:

Paying load	Lbs.
38 cars, 22,000 lbs. each	836,000
Locomotive	103,000
Tender, $\frac{3}{4}$ loaded	50,100
Caboose (eight-wheeled)	25,000
	1,594,100

The weight of the train may therefore be taken roughly at 800 tons. The resistance on the Kalamazoo grade may therefore be assumed as follows:

Grade resistance, 13.8 lbs. per ton	Lbs.
Frictional resistance, 6 lbs. per ton	4,800
Total resistance	15,840



Plan and Elevation, as Applied to Freight Trains.

THE WESTINGHOUSE BRAKE.

The tractive power of the engine is 149.4 lbs. per pound average pressure on the pistons and as

$$\frac{15,840}{149.4} = 106.0,$$

the average pressure on the pistons would be 106 lbs. per square inch. The adhesion of the engine would appear to be ample, for dividing the weight on the drivers by the tractive force gives the following result:

$$\frac{89,500}{15,840} = 5.65.$$

The tractive force is therefore $\frac{1}{5.65}$ of the adhesion weight, a co-efficient which should insure the engine against slipping in any ordinary weather.

The engine is fitted with the American steam driver brake, which is not, however, shown on the scale drawings. Hudson's steam bell ringer is used. The slide valves and pistons are lubricated by the Detroit sight-feed lubricators.

The cross-head is cast-steel, and the slide bars are wrought-iron, case hardened.

The principal dimensions of the engine are given below:

SPECIFICATION MOGUL FREIGHT LOCOMOTIVE, BUILT BY THE SCHENECTADY LOCOMOTIVE WORKS.	
General Dimensions.	
Fuel.....	Bituminous coal.
Gauge of road.....	4 ft. 8 1/2 in.
Total weight of locomotive in working order.....	103,000 lbs.
Total weight on driving wheels.....	80,500 lbs.
Total wheel base.....	21 ft. 6 in.
Driving and rigid wheel base.....	14 ft.
Length of main connecting-rod from centre to centre of journals.....	7 ft. 6 1/2 in.
Transverse distance between centres of cylinders.....	7 ft.
Cylinders and Valves.	
Diameter of cylinder and stroke of piston.....	19 in. x 24 in.
Horizontal thickness of piston.....	5 1/4 in.
Kind of piston packing.....	Dunbar.
Kind of piston-rod packing.....	U. S. metallic.
Diameter of piston-rod.....	3 1/4 in.
Size of steam ports.....	16 in. x 1 1/2 in.
Size of exhaust ports.....	16 in. x 2 1/4 in.
Greatest travel of slide valve.....	5 1/4 in.
Lap of slide valve.....	Outside, 1/2 in. Inside, 1/2 in.
Lead of slide valve in full stroke.....	1/2 in.
Kind of slide valve.....	Richardson's patent balanced.
Kind of valve-stem packing.....	U. S. metallic.

Wheels, etc.	
Diameter of driving wheels outside of tires.....	58 in.
Diameter and length of driving axle journals.....	7 1/2 in. x 8 1/2 in.
Diameter of truck wheels.....	30 in.
Diameter and length of truck axle journals.....	5 in. x 9 in.
Size of main crank pin journal.....	5 in. diam. x 5 in. long.
Size of intermediate crank-pin journal.....	5 1/2 in. diam. x 3 1/2 in. long.
Size of front and back crank-pin journals.....	3 1/2 in. diam. x 3 1/2 in. long.
Length of driving springs from centre to centre of hangers.....	Main, 44 in. Front, 34 in. Intermediate, 26 in.

Boiler.	
Style of boiler.....	Wagon top
Diameter of first ring (outside).....	54 in.
Material and thickness of plates in waist and outside of fire-box.....	Steel, 7-16 in. thick.
Horizontal seams.....	Treble-riveted with welt strip inside.
Circumferential seams.....	Double riveted.
Size of fire-box, inside.....	Length, 108 1/2 in. Width, 42 3/4 in.
Material and thickness of plates.....	Steel, crown, 1/4 in.; tube, 1/2 in.; inside of fire-box, 3/4 in. sides and back, 1/2 in.
Water spaces around fire-box.....	Front, 4 in.; sides and back, 3 in.
Crown stayed by crown bars.....	5 in. x 3/4 in., welded at ends.
Material of tubes.....	Semi-steel
Number of tubes.....	216
Outside diameter of tubes.....	2 in.
Length of tubes over tube sheets.....	11 ft. 5 in.
Heating surface in tubes.....	1,281.7 sq. ft.
Heating surface in fire-box.....	135.5 sq. ft.
Total heating surface.....	1,417.2 sq. ft.
Grate surface.....	32.3 sq. ft.
Style of grate.....	Rocking (finger bars), with drop plate.
Style of ash-pa.....	Hopper, with dump plates worked from cab.
Exhaust nozzle.....	Double.
Diameter of exhaust nozzle, each.....	3 1/4 in.
Throttle.....	Balanced valve in dome.
Inside diameter of stack.....	18 in.
Smoke-stack top above rail.....	14 ft. 6 in.
Boiler supplied by two Monitor injectors placed right side and at back.	
Boiler pressure.....	140 lbs.

Tender.	
Weight of tender empty.....	25,000 lbs.
Number of wheels.....	8
Diameter of wheels.....	33 in.
Diameter and length of tender axle journals.....	3 1/2 in. x 7 in.
Total wheel base of tender.....	14 ft. 6 1/2 in.
Distance from centre to centre of truck wheels.....	4 ft. 4 in.
Style of tender frame.....	Angle iron
Style of trucks.....	Schenectady Loco. Works patent four-wheeled, channel iron bolster, centre bearing front and back, with additional side bearings on back truck.
Water capacity.....	3,000 gallons
Coal capacity.....	6 1/2 tons

Engine and tender.

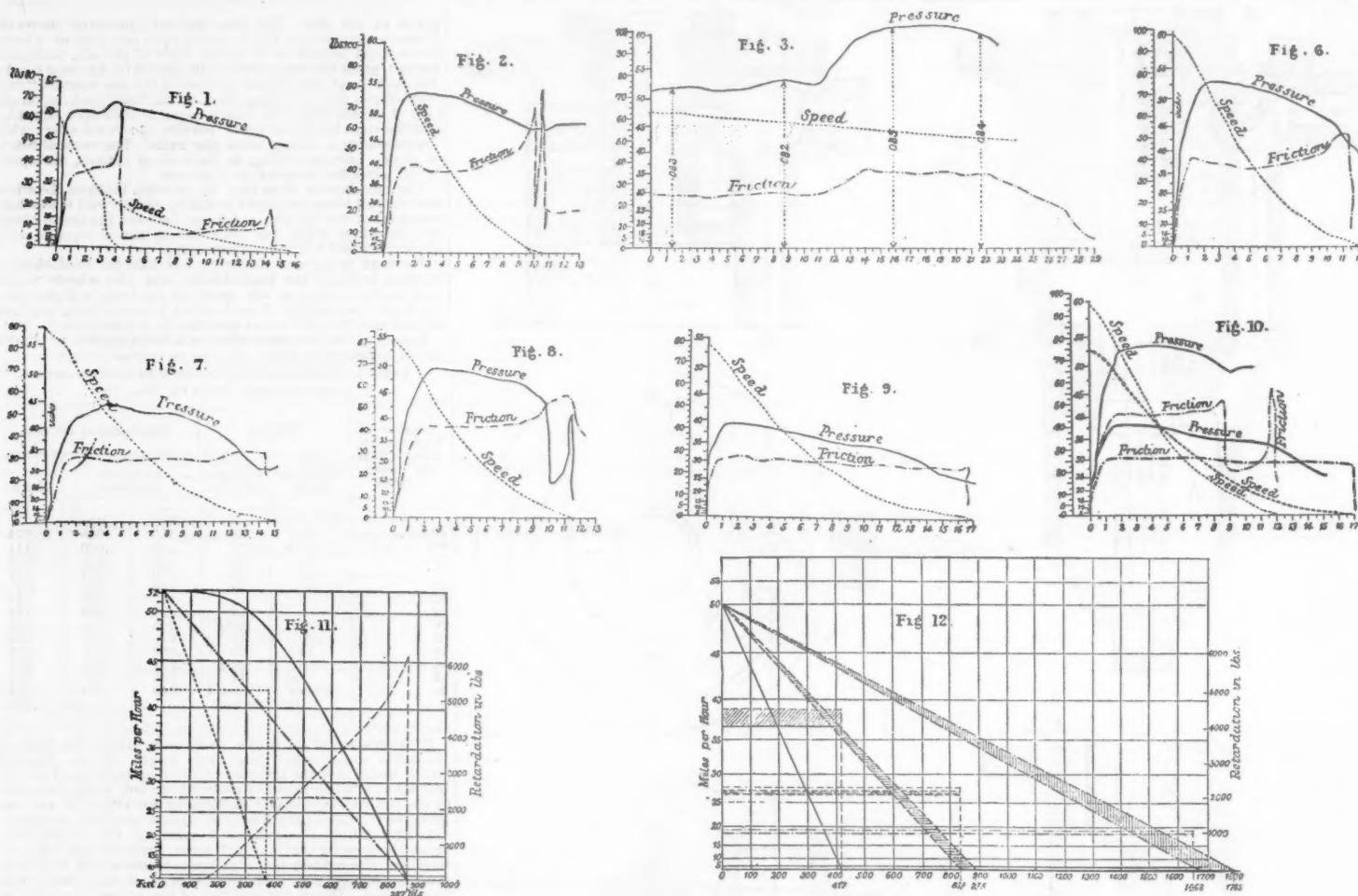
Total wheel base engine and tender.....	45 ft. 5 1/4 in.
Total length of engine and tender over all.....	54 ft. 7 1/4 in.

The Westinghouse Brake.

Further illustrations are given herewith of modifications of the Westinghouse brake as used at the Burlington trials. The driver brake here shown was described in the *Railroad Gazette* May 13, 1887, and the electric valve was shown in the issue of June 3.

The new quick-action triple valve is shown in plans and sections. In working the ordinary triple valve of the Westinghouse automatic air brake, air passes in through the train pipe by the openings *a*, *b*, *c*, into the drain cup *A*, from whence it goes up through holes *r*, into the chamber *B*, pushing up the piston 5 and the slide valve 6 connected with the piston. This is the normal position of the apparatus when the train is running. The piston and slide valve attached being full up, the brake cylinder is open to the atmosphere by means of the passages and ports *d*, *e*, *g*. To apply the brake, air is permitted to escape from the train pipe, which reduces the pressure at *B*, when the higher pressure in the auxiliary reservoir pushes down the piston 5, carrying with it the slide valve 6, thereby putting the auxiliary reservoir, by means of the port *l*, open to the brake cylinder. The degree of opening, and hence the quickness of application, is in direct proportion to the reduction of pressure made in the train pipe.

The new triple valve works precisely the same way as the old one when a light reduction of air is made in the train pipe. But when a quick stop is wanted, sufficient air is exhausted at first to make piston 5 push down valve 15 far enough to open the port *s*, when the air from the train pipe rushes up through a suitable passage *x* into the brake cylinder. When the air in the brake cylinder and in the train pipe comes to have the same pressure, the valve admitting air through *s* closes automatically and prevents the air from the auxiliary reservoir from passing into the train pipe. At the instant the descent of the piston 5 moves the valve 15



DIAGRAMS FROM THE GALTON-WESTINGHOUSE EXPERIMENTS ON THE EFFECT OF BRAKES.

be much greater than at low speeds, in order to produce the same amount of retardation.

The friction increases as the speed decreases according to some law, which is complicated, as shown above, by the time during which the brakes have been applied. If, therefore, the pressure necessary to cause sufficient friction to balance the adhesion at a high speed be continued until the train comes to rest, the friction will increase and gradually overcome the adhesion, and the wheels will become fixed. Therefore, in order to secure the best results in stopping, it is obviously necessary that the brake-block pressure should be regulated to give a friction about equal to the adhesion of the wheels at every stage during the process of stopping.

[A description follows of the pressure reducing valve designed by Mr. Westinghouse and used in the subsequent experiments.]

Table III. shows several of the experiments made on Jan. 20, 1879, by slipping the experimental van from the engine and bringing it to rest by means of the brake.

The diagrams, figs. 6, 7, 8, which have been selected from the experiments shown in table III., sufficiently illustrate the action of the valve. These diagrams show also very clearly the variation of the co-efficient of friction according to speed.

In the experiment, fig. 6, the van was stopped from a speed of 60 miles per hour in 12 seconds on a rising gradient of 1 in 264. The maximum brake-block pressure on all the wheels was 160 per cent. of weight on wheels at the beginning, and was reduced to 114 per cent. at the end. The friction increased during the end of the experiment so much as to cause the wheels to skid just at the end. The adhesion shown was about .25. In this case the pressure was not reduced sufficiently to keep the friction uniform. Had this stop been made on a steep descent, or had the brake-block been acting on only one pair of wheels, the time required to effect the stop would have been greater; and consequently the brake-block pressure, instead of being reduced, must have been increased, so as to have overcome the decrease in the holding power of the blocks which results from the length of time of application irrespective of the speed.

In the experiment, fig. 7, the van was stopped from a speed of 57 miles an hour on a rising gradient of 1 in 264 in 15 seconds. In this case the brake-block pressure was 114 per cent. of weight on wheels at the beginning of the experiment and was reduced to 54 per cent. during the end. The total friction of the brake-blocks on the four wheels may be estimated from the actual friction obtained for one pair of wheels at 3,244 lbs. at the beginning of the experiment and 3,144 lbs. in the middle, thus remaining very nearly constant, and it slightly increased to 3,400 lbs. toward the end. There was no skidding, but the greater length of time occupied in the stop shows that the pressure was not sufficiently high in the beginning.

Fig. 8 shows a stop from a speed of 55 miles an hour in 13 seconds, on a falling gradient of 1 in 264. The brake-block pressure at the beginning of the experiment was 143 per cent. of the weight on the wheels, and was reduced to 106 per cent. at the end. The resulting friction, as estimated for the brake-blocks on the four wheels, is 4,473 lbs. at the beginning, and 4,574 lbs. in the middle of the experiment, after which, as the pressure was not reduced with sufficient rapidity, it rose rapidly, and caused a skid at the end. The adhesion shown was about .25. In this case the stop was much better than that shown in fig. 7, because of the greater initial pressure and greater consequent friction.

Fig. 9 also illustrates this point by showing a stop from a speed of 55 miles an hour on a level in 18 seconds. The block-pressure was 87 per cent. of the weight on the wheels at the beginning, and 40 per cent. of the weight on the wheels at the end; and the consequent estimated friction was only 2,825 lbs. at the beginning, and at the end 2,530 lbs.; consequently a longer time was required for making the stop.

Fig. 10 further illustrates the necessity of a high pressure on the first application of the brakes if a rapid stop is to be effected. The solid lines show the speed, pressure and fric-

tion in a stop made from 60 miles an hour on a rising gradient of 1 in 311. The brake-block pressure was 162 per cent., or nearly one and two-thirds the weight on the wheels at the beginning of the experiment, but it was not reduced with sufficient rapidity; hence the wheels skidded at the end of 9 seconds, at which time the speed was reduced to about 17 miles per hour; and notwithstanding the skidding of one pair of wheels, the van came to rest in 167 yards and 12½ seconds. The dotted lines taken from fig. 10 show that from an initial velocity of 55 miles an hour, and with a brake-block pressure of 87 per cent. of weight on wheels, the speed at the end of 9 seconds had only been reduced to about 27 miles per hour, and the van comes to rest in 227 yards and 18 seconds.

The object of the regulating valve was to obtain a uniform brake-block friction during the whole progress of the stop, and to give this friction the highest possible value, i. e., a value as nearly as possible equal to the adhesion, and therefore just short of that which could cause the wheels to skid. It will be seen from the diagrams that the rapidity of the stop varied according to the greater or less approach made towards the attainment of this object, the resistance of the valve being purposely altered during the progress of the experiments.

The conditions for these stops were very favorable, and indicate an adhesion of the wheels upon the rails in excess of the average obtainable; which average, throughout 300 experiments, slightly exceeded .18 of the weight on the wheels.

These experiments were made with one van. Since making them the author has had the opportunity of making slip experiments on the Paris, Lyons & Mediterranean Railway with 12 carriages. The average of seven stops reduced to 50 miles an hour was 208 yards, with only 63 per cent. of the train braked. If brakes had been applied to all the wheels of the train, as was the case with the experiments with the single van, the result would have been 128 yards at 50 miles an hour, or a very close approach to the best results obtained with a single vehicle. The author has not had time to analyze these latter experiments fully, but he is able to state that they demonstrate that the stops which have been obtained with a single vehicle may also be obtained with a train of several vehicles.

The regulating valve here described is an outcome of the former experiments on this subject, and is proposed for the purpose of preventing the sliding of the wheels on the rails. Some such device is a necessary adjunct to a perfect brake, because it is only by the prevention of skidding that the maximum of efficiency can be obtained; whilst, in addition, skidding damages both wheels and rails, and increases the risk of accident. But the previous illustrations show that, however perfect any apparatus of this description may be, and however certainly it may act to prevent skidding, yet, owing to the very numerous conditions which affect the application of brakes, it is necessary, if at the same time the maximum allowable friction is always to be exerted on the wheels so as to insure the best result in stopping, that the action of the apparatus should be capable of being regulated from time to time, so as to meet the varying conditions as to adhesion, etc., on the line on which it is traveling; unless, indeed, some arrangement could be made by which the actual adhesion at the moment were brought into play to regulate the pressure.

In dealing with this subject, the author has not directed attention to the question of the influence of the rotating momentum of the wheels; but he now wishes to state what he has observed on this point. Usually there are in a train a certain number of vehicles braked and a certain number unbraked. If the brakes acted on all the wheels, then the rotating momentum of the wheels does not add to the distance in stopping a train, because that momentum can be acted upon by the brakes directly, without in any way making use of the adhesion of the wheels to the rails. It simply requires, therefore, an additional amount of brake-

block pressure, and, if a regulating valve be used, an allowance in the regulating valve to compensate for the rotating momentum.

With the unbraked portion of a train, the rotating momentum of the wheels is an addition to the momentum due to the weight of the train (including therein the actual weight of the wheels) which cannot be utilized for retardation; and it therefore seems important that there should be brakes on every wheel of a train.

The following table shows the distances required to stop a train on a level line from a speed of 50 miles per hour, with a retarding force of 5 to 30 per cent. of the total weight of the train:

TABLE IV.

Percentage of retardation.	Yards run at 50 miles per hour.	Percentage of retardation.	Yards run at 50 miles per hour.
5.....	555½	18.....	154½
6.....	463	19.....	146½
7.....	396½	20.....	139
8.....	347½	21.....	132½
9.....	308½	22.....	126½
10.....	277½	23.....	120½
11.....	252½	24.....	115½
12.....	231½	25.....	111
13.....	213½	26.....	107
14.....	198½	27.....	103
15.....	185	28.....	99½
16.....	173½	29.....	96½
17.....	163½	30.....	92½

If the brakes act upon each wheel, then a retardation of 10 per cent. of the load carried by each wheel—counting the rotating momentum as part of the weight—will stop a train in 277½ yards. If the brakes act upon only half of the weight of a train, a retardation of 20 per cent. would have to be exerted upon the braked half to produce the same result. As pointed out, 20 per cent. adhesion is rather above the average obtainable, while 24½ per cent. is the highest result obtained under the most favorable circumstances at any considerable speed, or except when sand was applied to wheels moving slowly.

The above table should be carefully noted, for it will be seen that, even if brakes act upon all wheels, 24½ per cent. retardation will only give 26 yards better result than 20 per cent., or if half of the train only be braked, 59 yards advantage. If compared with 18 per cent., the average obtainable, the advantage will be only 32½ yards for the train braked throughout, and 64½ yards for the train having brakes acting upon half of the weight.

A consideration of this feature of the brake problem points out, 1st, that the advantage to be gained by trying to get above 20 per cent. retardation on each wheel is greatly overbalanced by the risk of skidding; and, 2d, that it is far easier and safer to make a stop in 250 yards from 50 miles per hour with the whole train braked, than with brakes upon only half of the train. All of this points to the fact that in arranging friction valves, care should be taken not to exceed a safe limit of adhesion; for in the effort to get more work, less may be the result.

Too much stress cannot be laid upon the importance of the application of the full force of the brake-blocks against the wheels, and of the action being simultaneous against all the wheels of the train; for any loss of time seriously influences the action of the brakes in several ways, as has been already explained, independently of the actual loss of distance.

In illustration of this point, additional diagrams are appended. Fig. 11 shows the result of an experiment made on the 23d of August, 1878, in which the application of the pressure was gradual, so as to represent the effect of a slowly acting brake; and which furnished a diagram of a stop nearly

identical with that of one of the best stops of the vacuum experimental train on the Northeastern Railway in October last. It exhibits by the curved line the speed and retardation obtained in the experiment; and also the comparative result which would have been obtained if the full pressure had been applied at once, and the consequent friction had been generated at once between the brake-block and wheels, and if this friction has been obtained at a uniform amount. The stop would, in the latter case, have been made in 125 yards instead of 287 yards, the actual amount. The thick dotted line shows a stop which might have been made in the same distance, if the very moderate retardation indicated by the horizontal line had been applied at once. It will be noticed that this stop is much better than the actual stop, though made in the same distance, because at any intermediate point the speed is much lower. Hence at 300 ft., for instance, the energy left in the train, as shown by the thick horizontal line, is only three-fifths of that shown the actual stop.

Diagram No. 12 illustrates the advantage of applying the brakes to every wheel of a train. The full diagonal line indicates the distance in which a train could be stopped from 50 miles an hour with the retardation of 20 per cent., shown by the upper horizontal lines, applied to every wheel in the train. The dark shade below the horizontal line shows the extra retardation required to overcome the momentum of the braked wheels. The middle diagonal line shows the distance in which a train could be stopped from a similar speed with the retardation of 20 per cent. applied to half the wheels and half the weight of the train, as indicated by the middle horizontal line. The shade beneath shows the extra retardation required to overcome the momentum of the braked wheels, and the extra distance which would be run by the train in consequence of the momentum of the unbraked wheels.

English Railroads—Their Administration, and the Status and Duties of Executive Officers.

II.

THE RAILWAY CLEARING HOUSE.

In a previous article it was said it is impossible to follow out the duties of the principal officers of English railroads without constant reference to the part the Railway Clearing House plays in the administration of English railroads. The Clearing House, as its name implies, fulfills the same functions, as between one railroad company and another, that the Bankers' Clearing House fulfills as between one bank and another. Indeed, it was founded on the model of the Bankers' Clearing House, in 1850, mainly through the efforts of a banker, the late Mr. Glyn, at that time one of the directors of the London & Northwestern Railway Company and father of the present Lord Wolverton, of the firm of Glyn, Mills & Co., the London bankers. Mr. Glyn, seeing the benefits to banking arising from a quick and ready means through a common centre of adjusting accounts, inaugurated a similar system for railroads, as regards traffic interchanged, and in order to secure obedience to the decisions of any such institution, an act of Parliament was obtained in the year 1850. Under this act any railroad company voluntarily joining the Clearing House, and subscribing to its rules, has to accept without appeal the monthly settlements or "balances" of moneys due by or to it declared by the Clearing House, and the latter body has the power of legally enforcing these claims. This was the first and main function of the Clearing House; but as time advanced, and the working of railroads became more and more complex and diversified, new wants arose, which could only be met by an impartial referee or arbitrator like the Clearing House. Accordingly new duties have from time to time been added to the already burdensome task of the Clearing House, till now its work is measured in one item alone by a central office containing about 1,200 heads of departments and clerks,* in London, near the London termini of the London & Northwestern, the Midland and the Great Northern railways in Easton Road. At those central offices are held the various meetings and conferences of directors, delegates, officers, etc., most of them being monthly; but there is hardly a week, or a day, that there is not some gathering of directors or officials in session. The supreme committee is called the "Clearing House Committee," consisting of delegate directors chosen by the boards of their respective companies under sealed resolution, and subordinate to this is the general managers' conference, and lower down are the conferences of goods managers, traffic superintendents and accountants, with the various sub-committees they are constantly appointing to report upon special matters. The most fertile themes for discussion are the classifications of rates for goods and minerals and the by-laws regulating the thousand and one matters which arise in the daily working of traffic—passenger, goods and mineral—passing over several companies' lines in one direct consignment.

No decision of the Clearing House on traffic questions is binding upon any company until the board of directors of that company has formally notified its approval of them, and the printed by-laws of the Clearing House contain numerous instances of reserved rights, by particular companies, who dissent from a rule here and there. The several companies and "parties" (as the statute and practice call them) to the Clearing House in England still retain all their individual rights to arrange matters of traffic, etc., local to their respective systems absolutely according to their own wishes; and they are further at liberty to withdraw from the Clearing House whenever they please. They can also conclude traffic arrangements with other companies direct, and prescribe the details of division (or "pooling") of the earnings, the same being relegated then to the Clearing House to carry out.

It would be impossible to overestimate the facilities the Clearing House renders to through traffic working; or to over-value the smoothness and convenience which it secures both to the public and the railroad companies themselves. It is probably the most completely systematized portion of the whole railroad administrative machine in Great Britain. But there the grounds for admiration begin to diminish. It

* Exclusive of wagon number takers at junctions, or inspectors and clerks throughout the country.

is when we come to examine the details of its goods and mineral classification, originally designed to secure uniformity on through traffic, passing from one company's system to another, that the unscientific and contradictory features seem to come out most strongly. The rate of freight is governed by the particular class an article is ranged under; and as there is no finality in the developments of manufactures any more than there is in other things human and mundane, constant changes are going on, removing a particular product or article from one class to another, arising principally from the complaints of particular manufacturers or traders who feel aggrieved. Chemical productions and iron manufactures of late years have afforded some of the most fertile subjects of change and discussion.

But the fundamental weakness underlying all that difference of classification rate is that no better approach to a scientific fixing of a classification or a rate is afforded than the time-worn question, "What, after all, will the article bear?" It comes to that in the long run. It may be shown to demonstration that the bulkiness, the breakability or the absence or presence of a greater or less degree of risk of damage, the perishability or the inherent value of a thing, or what again is more to the point—the cost of haulage, all justify such and such a rate, yet it is all of no avail against the conclusive argument that if that rate be charged it will kill that industry, or it will divert it to some other part of the country, or even to the continent, or to some other means of transport. For this reason both the classification of the Clearing House and the class rates of the railroad companies applicable to that classification are considered by some as a mass of incongruities and contradictions puzzling alike to the legislator and the trader.

Added to these rates are the different sums charged at different towns and cities, called "terminals," which vary according to the cost of handling merchandise and the interest and depreciation upon capital expended in providing terminal accommodation.

Still, with all these drawbacks, the Clearing House as an organization is created and governed by the railroad companies themselves. Politics, or commissions formed of politicians have no voice in its affairs. Every man in the Railway Clearing House, from the Secretary (who is the chief and almost sole head of the Clearing House) and the heads of divisional departments, to the youngest book-keeper, is an expert in his particular work. The staff is, perhaps, more carefully selected and more highly skilled and officered than the corresponding staff in the accounts and audit department of any individual railroad company. It occasionally furnishes good managers to the railroads themselves; for example, Mr. John Noble, the present General Manager of the Midland Railway (and successor to Sir James Allport, after several years probation as Assistant General Manager), came from the Railway Clearing House.

Its affairs are conducted noiselessly and without friction, but the printed minutes and reports are not made public or furnished to the press in any way.

As we said previously, the chief governing committee consists of delegate directors. The duties of the latter are largely perfunctory. They almost invariably confirm the action of the officers' conferences, since the decisions of the latter are of a specially technical character, upon which the officers are better able to pronounce a sounder opinion than the directors. But on the boards of their own companies these same directors exercise a very real share of control. In those arenas they have ample scope for saying whether a road ought to be extended or more lines of rails laid down; whether a new station or bridge should be constructed, or what parliamentary action should be taken to promote new lines, or oppose lines promoted by other companies; and what dividends should be paid, or what officers advanced or removed, and who should be held responsible for accidents, collisions and so on. In fact, they have as much voice, if they choose to exercise it, in general questions of policy, management and finance as the Chairman (President) himself, who on an American railroad is almost omnipotent.

The Chairman of an English railway never holds the "control" of a road, in the sense of owning or controlling a majority of the shares or stock, as in America. He rarely or never dabbles wholesale in stocks, least of all those of his own company, on the Stock Exchange; and the last thing he thinks of, or would be allowed by his colleagues to attempt, is the manipulating of the earnings or expenses in such a way as would create a "surprise" dividend with a view of influencing the prices of the company's shares in the market.

The companies publish their traffic earnings weekly, scrupulously to the hour they are made up, and they are despatched by telegraph in many cases to the press by the audit department, so that no time is left for any one to profit by the possession of exclusive information. Fortnightly statements of expenses are likewise published by some companies with like intent; and the same companies print and publish their half yearly detailed statements of account frequently within 14 days of the close of the half year. It is no uncommon thing to see meetings of shareholders held and dividends declared within three weeks of the close of a half year. This applies particularly to three railroads presided over by Sir Edward W. Watkin, M. P., himself well acquainted with American railroads and formerly a frequent visitor to America and Canada in connection with the Grand Trunk, the Erie and other railroads.

Electric Brakes in France.

The Bulletin of the International Commission of the Railroad Congress, for April, 1887, contains a note upon the application of electricity to freight train brakes in Europe and the United States, by Mr. Weissenburch, engineer for the

Ministry of Railroads, etc., of Belgium. We make some abstracts of his paper:

Nobody disputes the advantages of electric brakes since the trials made by the State railroads of France and the Eastern Company of the Achard brake. The diagrams made by M. Ricour for the comparison of the Westinghouse automatic, the Hardy automatic and non-automatic, the Wenger and the Achard brakes, show that the electric brake was superior to all others in rapidity of application and of release; that it was at least as good as the best of the others in graduation. M. Parent, Chief Engineer of Material and Motive Power of the French State railroads, has added his testimony to that of Ricour, in discussing the question as proposed by the railroad congress of 1885. M. Parent classes the various brakes in the following order, in quickness of application: Achard electric brake, Hardy automatic brake, Westinghouse brake, Wenger brake, and the Hardy non-automatic. In quickness of release they are classed in the following order: Achard electric, Westinghouse, Wenger & Hardy non-automatic, Hardy automatic. As to the time required to develop the same amount of braking power from the commencement of the application until the release, the order is as follows: Achard electric, Westinghouse, Wenger & Hardy non-automatic, Hardy non-automatic. The conclusion of course is that the Achard brake stands first.

Nevertheless the use of electric brakes has not extended. The reason is that they entered the field too late. The use of batteries, also, was a prohibitory cause, and when dynamos were so far perfected that they could be applied to work the Achard brake, the rival brakes were too solidly established. The installation of a continuous brake on all the passenger cars of a railroad is a great expense, and a system can be only changed for very serious reasons. On the other hand, the use of one kind of brake by one system of roads leads related systems to adopt an analogous kind. It is thus that the State has adopted the Wenger straight air brake, because its system touches at many points the Orleans and the Western.

It should not be said that the Achard brake is less practicable than the vacuum or straight air brakes. If it could have been adopted by one great company it would have rapidly taken a high place among its competitors. In reality, the different pieces of which it is composed are strong and easily inspected. The mechanism offers no great chance of breakage or derangement. M. Vicaire, in a report to the Northern Railroad Company, the 10th of March, 1879, says there is nothing in the Achard brake comparable as to delicacy of construction and chances of derangement with the triple valve of the Westinghouse, and as to couplings, it cannot be said that they are more difficult to maintain in good condition than the rubber hose of the air brakes. Moreover, it must be remembered that the details which make an apparatus practicable can only be developed after it has been subjected to the conditions of actual service. Mr. Westinghouse has taken more than fifteen years to bring his brake to its present point of perfection.

But if existing conditions make it seem improbable that the electric brake will ever be adopted for passenger cars, except on systems which have no relations with other roads, that is not at all with the freight trains. In Europe the present practice with freight trains is at the same point which it had reached 12 years ago for passenger trains. The tender and brake van are provided with hand brakes, and, according to the exigencies of the grade or load, one or more wagons with hand brakes are introduced at various points in the train. This practice is not up to the level reached in other branches of operation.

The writer then reviews the condition of the brake question and practice in America, and gives some summary of the results of the Burlington trials last year.

The Archard brake was described in the *Railroad Gazette*, Nov. 5, 1880. A magnet when energized by a current is attracted to the axle, and by it set to revolving, causing the brake chain to be wound around a shaft. The electric current was supplied by batteries with a Planté accumulator, but it was proposed to use a dynamo.

The Sturtevant System of Heating Shops.

The accompanying illustrations representing this system as applied to the new shops of the Pittsburgh, Cincinnati & St. Louis at Columbus, Ohio. The shop shown in our illustration is the paint shop, where it is, of course, very necessary that the temperature should be even and somewhat high in all weather, so as to dry the paint. Good ventilation is, of course, also essential. The system has already been briefly described in these columns, but the novelty of the system and the many advantages claimed appear to justify an amplification of our previous description.

The methods employed differ widely from those in general use, and the facility with which the heat can be regulated, and the excellent circulation of air attained, render the Sturtevant system worthy of careful investigation. The air is heated by contact with steam pipes, but these pipes are not placed round the floor of the shop as usual, but are concentrated at one spot, however large the shop, while the floor is perfectly clear and unobstructed by any pipes or ducts of any kind. The steam pipes are arranged in a sort of grating forming one end of a light wrought-iron box, which is approximately air-tight. A fan sucks air through the grating of steam pipes and drives it into a large pipe formed of light No. 22 gauge galvanized iron. This pipe is supported from the roof of the shop at a convenient distance overhead, so as to be clear of engines, cars or machines, as the case may be. Numerous branch pipes lead downward from this air main to within a distance of about 6 or 7 ft. above the floor. The ends of these

pipes can be either wholly or partially closed by means of simple sliding valves formed of a sheet of galvanized iron.

The fan thus sucks the air through the nest of steam pipes and forces it through the large pipes, distributing it through the shop. The warm air being directed downward first strikes the floor of the shop and then circulates. If the outer doors of the shop are all closed to prevent any ingress of external air, it is evident that the air in the shop must be continually drawn through the fan and thus kept continually circulating. That the circulation is considerable may be judged from two facts. No smell of paint is perceptible in the car paint shop at Columbus, and we are informed that the shops can be comfortably warmed in half an hour. This would be impossible unless the circulation of air was so considerable that every particle of air had repeatedly passed through the fan in that time.

Most systems of heating possess one great defect. It is very difficult to regulate the temperature of the building. The system adopted at Columbus appears, however, to possess several independent methods of regulation. The speed of the fan can be varied. If run fast, a great quantity of air is passed through the grating of steam pipes, and as the same air is passed through again and again, it soon becomes well heated. Thus the fan can be run fast for some little time before the men commence work in the morning, and consequently the shop is comfortably warm when they arrive, and their tools can be handled with comfort, and are not cold and clammy. The speed of the fan can then be slackened and the shop kept at an even temperature, so that the heat taken from the air inside the shop by contact with the cold roof, walls and floor is again restored, as the air is again passed through the grating of steam pipes.

The heat can also be regulated by admitting either live or exhaust steam to the pipes, or a mixture of both. By opening a door near the steam pipes the cold external air can be drawn in, instead of the comparatively warm air from the shops.

The above methods of regulation apply to the whole shop, but the valves at the ends of the hot air ducts afford a means of regulating the heat in any part of the shop. If a man feels it too warm, he simply partially, or entirely, closes or shuts the valve near him. If, on the contrary, he is too cold, the valve can be pulled full open.

The fan can be driven by a belt when shafting is convenient, as in a machine shop. In a paint shop or a building where there is no power, a small engine is employed, as shown in our illustration.

The cost of the apparatus is, we understand, considerably higher than that of ordinary apparatus, but it is, of course, a question whether the excellent circulation and easy regulation is not well worth the extra cost. The pipes being all close together and arranged in short lengths, any leakage can be easily detected, and no trouble is likely to arise from contraction and expansion.

Warm air in circulation will, of course, dry paint more quickly than stagnant air at the same temperature, and the gain in time of painting passenger cars is reckoned to be something like 10 per cent. As passenger cars occupy a good deal of shop room, this is a valuable consideration. On many roads the paint shops are so chronically overcrowded with passenger cars that it is difficult to take in cars which really need repainting. If cars can be repainted in less time, the capacity of the shop is virtually increased, and in this way any system of heating which keeps the air in rapid circulation presents great advantages.

The following figures relate to the paint shops at Columbus:

The cubic contents of the shop is 272,665 ft. The number of revolutions of fan per minute varies greatly; on warm winter days the engine is shut down, so that the fan just keeps moving and no more. In the coldest weather it has been run up as high as 200 revolutions per minute.

It is claimed, that under favorable circumstances and conditions, this fan will deliver about 218 cubic feet of air to a revolution, but under adverse circumstances and conditions, that is, through long trains of distributing pipe, and drawing through the heater, this capacity should be discounted about 50 per cent., in order to arrive at safe actual figures. The heating surface exposed in the heater is 1,034 sq. ft. The size of the cylinder is 6 in. x 9 in. stroke, and the boiler pressure is 80 lbs. per square inch.

TECHNICAL.

Electric Light Carbons.

The electric carbon pool went into effect on May 1. It is composed of four companies in Cleveland, two in St. Louis and one in each of the following places: Pittsburgh, Pa. North Adams, Mass., and Buffalo, N. Y. Two years ago the price of carbons was \$35 per thousand, but the price has fallen to \$10, and in some cases for larger orders to \$5 per thousand. The capacity of the works mentioned is 200,000 carbons per day, while the demand is about 150,000.

Frictional Tests of Aluminium Bronzes.

Mr. Edward D. Self, in his graduation thesis on "Aluminium and its Alloys," presented to Stevens Institute last year, gives some interesting results of friction tests of aluminium bronzes made on Professor Thurston's lubricant tester.

A sleeve of 10 per cent. bronze was turned to run accurately in hardened steel boxes, placed in the pendulum of the above machine, and run at 300 pounds pressure and 1,200 revolutions per minute, until the surfaces in contact were worn smooth. During this process, the pendulum was occasionally removed to admit of polishing with crocus cloth, the places that had worn rough. After the journal had thus been run for a day, a similar one of ordinary box metal was treated in the same way. After each was made perfectly smooth, they were carefully cleaned from oil and benzine, cooled and weighed. The test then made consisted in running each for 90 minutes, and noting the temperature of the journal and deflection of the pendulum every five minutes. The steel boxes used were cut away on the sides, and came in contact with the journal only on the top and bottom. This per-

mitted a greater pressure to be employed, and allowed a free circulation of oil. The oil used was winter bleached sperm used as a standard for comparing oils sent to the Stevens Institute to be tested. An observation of the following table will show the exact behavior of each alloy tested:

Al. Bronze, 10 per cent.			Box Metal.		
Temp., F.	Deflec.	Time.	Temp., F.	Deflec.	Time.
84	1.5	0	75	1.6	0
90	1.4	5	83	1.6	5
94	1.4	10	90	1.5	10
99	1.3	15	95	1.4	15
102	1.3	20	99	1.4	20
108	1.3	25	102	1.3	25
110	1.3	30	104	1.3	30
110	1.3	35	104	1.3	35
110	1.2	40	105	1.3	40
110	1.2	45	105	1.3	45
111	1.2	50	105	1.2	50
111	1.1	55	107	1.2	55
111	1.1	60	109	1.2	60
111	1.1	65	109	1.2	65
111	1.1	70	109	1.2	70
111	1.1	75	109	1.2	75
111	1.1	80	109	1.2	80
111	1.1	85	109	1.2	85
111	1.1	90	109	1.2	90

Weight of bronze before test.	Milli-grams.	Weight of box metal before test.	Milli-grams.
148.918		166.3675	
148.890		166.3635	
Difference.....	.028	Difference.....	.0040

From these data, it is noticed that with the bronze journal the friction is less and the temperature of the journal higher; but the wear is very great compared with box metal. The loss of weight is probably greater than if a steel journal were used to run in aluminium bronze boxes. The wearing capacity of the bronze, remarks Mr. Self, doubtless depends on a very slight change of some of its ingredients, or the addition of some hardening element. If the excessive wear can be prevented without at the same time increasing the friction or temperature of running, aluminium bronze can be made a formidable competitor with the various box metals in the market.

A New Method of Making Tubes from Solid Bars.

The following note was presented at the fifteenth meeting of the American Society of Mechanical Engineers by George H. Babcock, of New York:

We have all heard of the Irishman's method of making a

cannon by "taking a hole and pouring melted iron around it," but it has been reserved for a German actually to do a similar or apparently an even more difficult thing—to take a hole and force a bar of wrought iron or steel around it!

The specimens which I have the privilege of exhibiting to the society tell their own story, and scarcely need the evidence of the eye witness who saw them made, and who loaned them for this purpose. As yet the process has not been worked in this country, but it is in practical operation in Germany. It is the invention of two brothers named Mannesmann, of Remscheid, and the *modus operandi* is as difficult to understand and explain as was Gifford's injector or Bohnenberger's gyroscope.

The apparatus necessary to effect the result consists of two rollers slightly conical, the axes of which are in different planes—or form two lines in a twisted surface—their nearest approach being at or near the bases of the cones. The surface of the cones may be threaded in such a way that they tend to draw a body rolling between them towards their larger ends. The bar to be operated upon should be approximately round, and its end is to be inserted while hot, between the cones, its axis being intermediate at all points to the axis of the rollers. The action of the cones is to draw out and twist the bar, during which operation a hollow forms in its axis, and when the bar emerges, it is a tube with a somewhat rough but approximately cylindrical and concentric bore, the surface of which shows a decided twist.

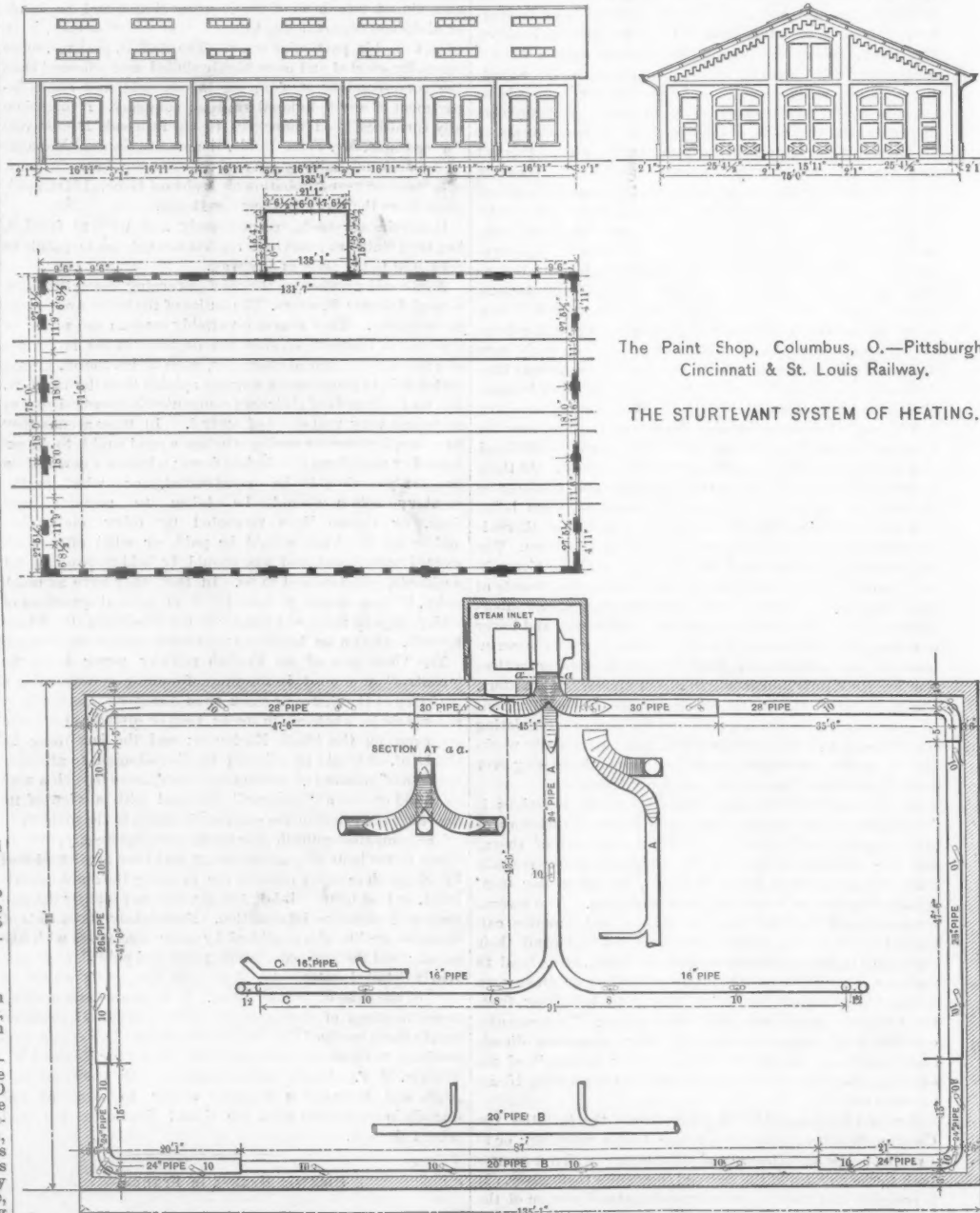
Among the exhibits is a bar which was drawn down at each end before going through the mill, so that no action took place at these ends. This bar, after cooling, was broken, and shows conclusively by the color and character of the bore, that no tool and not even the air touched it during the operation, the interior having the same appearance as the surface.

The tubes thus formed are applicable directly for some purposes, but by a proper formation of the rolls behind the bases of the cones, or additional pairs of rolls, with suitable mandrel or mandrels, this tube may, at the same heat, be expanded and finished into a regular weldless boiler tube or gas pipe, as some of the specimens shown; or this may be done at a separate operation.

That the metal is not harmed by this rather rough handling may be inferred from several specimens shown of tubes which have undergone operations of expanding, flanging, flattening, etc., which would try the temper and quality of any respectable tube. Specimens are also shown of brass and copper tubes made by the same process.

Locomotives at the Manchester Exhibition.

There is a very good display of locomotives. In the Irish section will be found a fine express four-coupled bogie engine built at the Inchicore works of the Great Southern & Western Railway by Mr. Ivatt, who has succeeded Mr. Aspinall,

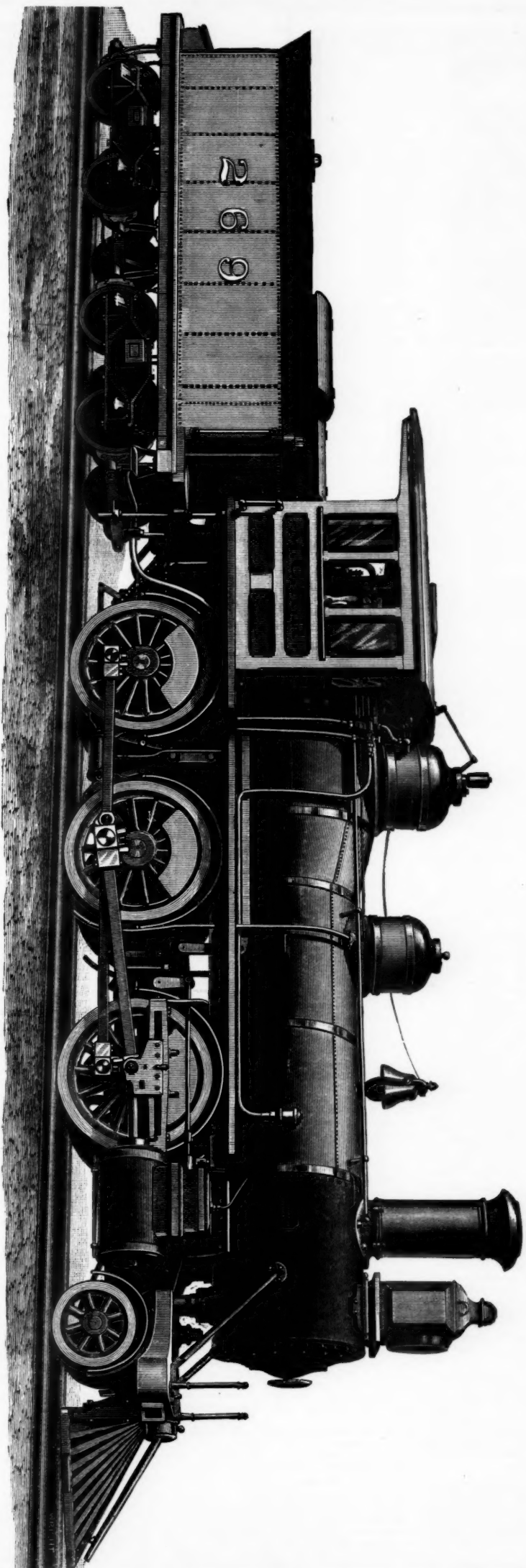


The Paint Shop, Columbus, O.—Pittsburgh, Cincinnati & St. Louis Railway.

THE STURTEVANT SYSTEM OF HEATING.

Plan of Paint Shop, Showing Arrangement of Hot Air Pipes.

THE STURTEVANT SYSTEM OF HEATING.

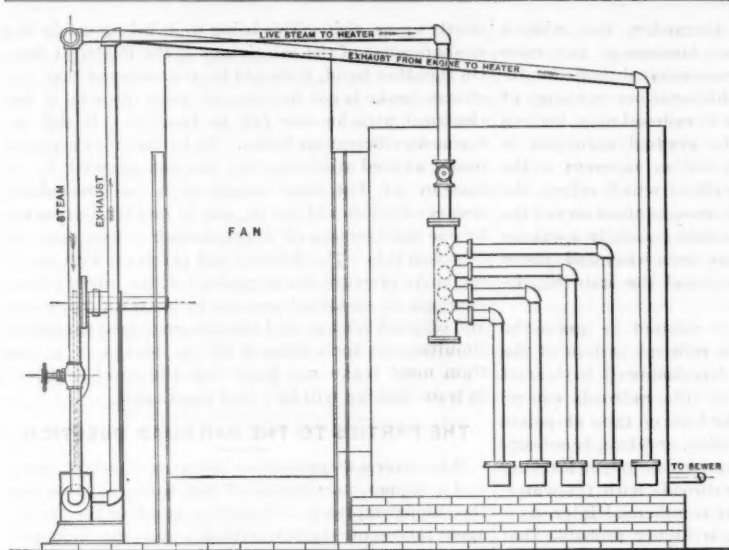


MOGUL FREIGHT LOCOMOTIVE, MICHIGAN CENTRAL RAILROAD.

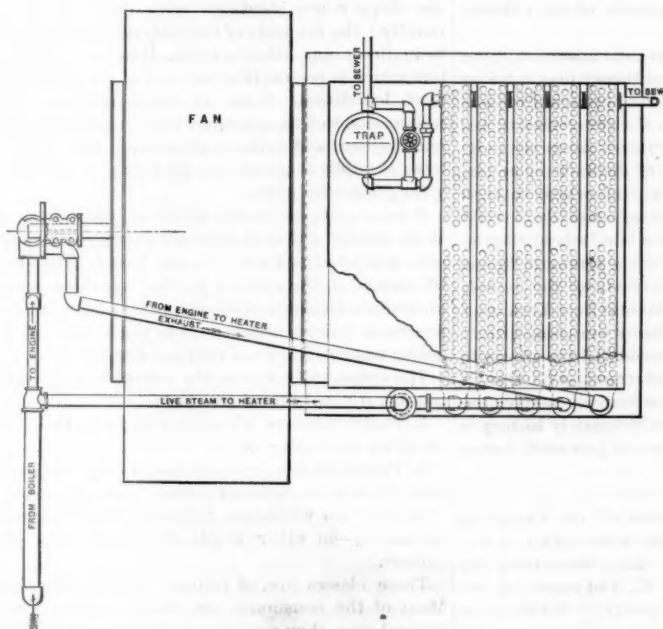
Built by the SCHENECTADY LOCOMOTIVE WORKS, Schenectady, N. Y.



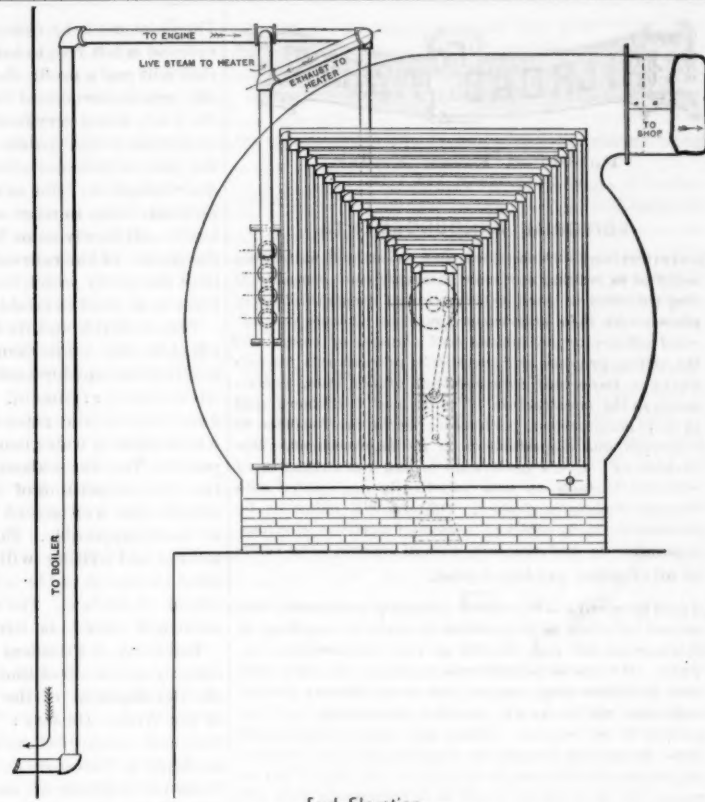
Illustration of a steam locomotive and passenger car, showing the engine and the car with windows.



Side Elevation



Plan.



End Elevation.

THE STURTEVANT SYSTEM OF HEATING—ARRANGEMENT OF HEATER AND FAN.

as locomotive superintendent of that line. Messrs. Sharp, Stewart & Co. show near the railway entrance a Consolidation goods engine and tender for lines of one metre gauge, designed for heavy traffic on mountain railways, and to traverse curves of 100 metres radius. The engine and tender combine the best features of both English and American practice. The engine has the American pilot or leading truck, and compensating beams, to secure flexibility, with steel plate frames and attachments, as usual in English practice. The boiler is of steel, the fire-box of copper, and the tubes of wrought iron. The wheel centres are of cast iron, their tires, axles and crank pins of steel. The motion is of the link type, actuating the valves through rocking shafts, the valves being placed above the cylinders. The arrangement of the smoke-box and chimney is in accordance with the latest American practice, the smoke-box being extended to allow room for ashes to accumulate without interfering with the draught in the lower tubes; a hopper is provided for clearing out the ashes when standing. The boiler is fed by a pump and an injector of the builders' American type. The cab is roomy, and seats for the driver and fireman. The headlamp and cowcatcher are noticeable Americanisms in this engine; also the boiler clothing plates, which are of planished steel. The tender is carried on two four-wheeled bogies, with steel-plate frames; it is fitted with a screw brake. The workmanship and finish of both the engine and tender should be specially noticed.

Principal Dimensions.

Outside cylinders—diameter.....	15½ in.
stroke.....	18 in.
Heating surface—fire-box.....	68 sq. ft.
tubes.....	681 sq. ft.
Wheels—diameter of driving.....	3 ft. 0 in.
diameter of truck.....	2 ft. 2 in.
Wheel-base—fixed.....	11 ft. 6 in.
total.....	17 ft. 8 in.
Weight of engine in working order:	
On drivers.....	24 tons.
On truck.....	3½ "
Total.....	27½ tons.
Tender:	
Capacity of tank.....	1,400 gals.
Diameter of wheels.....	2 ft. 2 in.

The tractive power of the engine is naturally high, the wheels being very small, and the speed low. The calculated duties are:

On a level.....	1,200 tons.
On an incline of 1 in 100.....	330 "
1 in 50.....	175 "

Exclusive of the weight of the engine and tender.

Mr. Webb has sent one of his compound engines, and beside it is the reproduction of the Rocket, which attracted a good deal of attention at Liverpool last year.—*The Engineer.*

Trials of the Rote Brake.

Under date of June 1 the Rote Automatic Brake Co. write to Mr. Rhodes as follows, concerning the brake trials:

Much to our regret and greatly to our disappointment we learn from Vice-President Agnew that your committee does not see its way clear to extend the trials at Burlington long

enough for our 50 cars to enter them. We are pushing the work of equipping them and shall then go through a series of tests and also a long run test on the Erie Railway—such as some of the railroad papers suggested is desirable and necessary—from Chicago to New York. We respectfully suggest, that inasmuch as the action of your committee prevents the appearance of our brake at Burlington, and as we know we have, in good faith, made every effort to be there, that you should appoint one of your number to accompany our train from Chicago to New York, witnessing and reporting upon its performance under the various tests—more numerous than those which you were able to provide for at Burlington—and allow me to add, that in case your duties and engagements permit, it would be personal and agreeable if you yourself could be the member selected. * * * During this long test we expect to be able to show you just how our brake will work under any and all conditions of practical railroading, which, of course, none of the brakes could do with the necessarily limited number of tests arranged for at Burlington."

Trials of the American Brake.

Under date of May 25, the American Brake Co. writes to Mr. Rhodes as follows:

In response to your circular letter asking if this company would participate in the tests at Burlington, we advised you in the affirmative, fully expecting to be prepared in ample time to do so.

We purchased a train of fifty cars, and made every effort possible to have it ready in time for appearance at Burlington, but being overcrowded at our shops with regular orders to be filled for our brakes, we were forced to contract with outside shops to do a greater portion of the work, and when the brakes were set up complete on the train and the tests made, we found that this work done on the outside was so defective as to make it impossible to complete the brakes in perfect shape in time to appear at Burlington. As we had tested our devices thoroughly, and were satisfied that they all right, we did not expect this drawback at the last moment in the merely mechanical work. We therefore had to abandon the idea of appearing at Burlington, but will now take the work into our own shops, and hope soon to have our train in complete working order. The results of any tests will of course be made public.

We regret exceedingly not having been present, and there would have been no doubt about our participating in the tests had we not been forced by the overcrowded condition of our shops to contract outside for important mechanical work.

Oregon Pine for Car-building.

There is to be on exhibition at the Car-Builders' Convention in Minneapolis specimens of the timber generally known as "Oregon pine," but which is really a fir (*Picea douglasii*). The exhibitors are confident that it is especially well suited for car-building, claiming that it has the tensile strength and stiffness of oak, with 20 to 25 per cent. less weight. Experience has proved it to be magnificent for bridge timbers, the contractors having used it exclusively on the Oregon Railway & Navigation Co.'s lines, and the Western division of the Northern Pacific. The great lengths which can easily be obtained fit it peculiarly for such structures. For

logs 32 ft. long the saw-mills pay no more than for shorter lengths, and for 40 ft. lengths only 50 cents per 1,000 ft. more, and the supply of such lengths is illimitable. The manufacturers in Oregon and Washington are confident that, notwithstanding the long transportation, they can supply this timber for car-builders east of the Rocky Mountains at prices which will be lower than for eastern lumber of equal quality, and they think that the very low cost at which such timber can be had on the Pacific Coast will make the manufacture of cars there a profitable enterprise.

Notes on the Physics of Iron and Steel.

At the meeting of the British Iron and Steel Institute, Mr. Daniel Adamson, the new president, pointed out in his address that the purest iron now attainable, 99.2 per cent. iron, will only carry a maximum load of 19 tons per square inch, while permanent set occurs at half this strain. This iron is wonderfully malleable, welds at a comparatively low temperature, and "will endure without stress, percussive or concussive force, far exceeding that which can be borne by the mildest steel."

In mild steels every increase of carrying power is accompanied by a decrease in ductility and malleability. Brittleness at color heats closely follows the same law: The increase of the alloying elements, which give increased carrying power, upon the ability to endure percussive forces at temperatures ranging from 340° to 700° F. And presuming that the high alloyed steel suffers most over a larger range of color heat, and is less to be depended upon, from 400° to 430° would be the highest range of temperature that a strong metal could work at safely.

The conclusion drawn is that the temperature of high steam, corresponding to say 350 lbs. per square inch, would be the greatest at which a boiler could be worked, from this point of view, and it is asserted that when a railway carriage axle gets so hot when in use as to evaporate or boil off the grease, brittleness, except in the mildest of steels, is developed by that temperature.

Mr. Adamson, calling attention to the fact that a material could be selected varying in tensile strength from 19 to 60 tons per square inch, agreed, in fact, with Mr. Metcalf's remarks before the American Society of Civil Engineers, that besides judicious selection much rests with the way in which the steel is worked, the stronger the metal the greater skill required in manipulation.

In the matter of guns Mr. Adamson seems in favor of a lower tensile strength than that adopted at Woolwich, saying: "The greatest evils that have befallen steel guns have arisen from the material used being composed of too strong a metal, having little ductility and special weakness at low color heat, and at best a material not calculated to resist concussion shocks induced by the explosion of gun-powder or the development of such heat as can be produced by quick firing. We need not under all the circumstances be surprised at cannon bursting."

A recommendation was made with reference to the discussion before the American Society of Civil Engineers that the Iron and Steel Institute take up the same subject with the prediction that the conclusions arrived at would be likely to lead to the use of a more ductile and reliable metal than had been submitted for adoption at Woolwich.

The application of steel to rails and tires was thought to have added one per cent. to the dividends of railroad companies, the value of which is put at £120,000 per week.

Among the papers presented were: one by Mr. E. C. Potter on the South Chicago Iron and Steel Works, with details of their cost; two by Sir Bernard Samuelson, M. P., one of which was on the cost of erecting blast furnaces, and one by Mr. James Riley, of Glasgow, "On some Investigations regarding the Effects of different Methods of Treatment of Mild Steel in the Manufacture of Plates."

The Eads Ship Railway.

A meeting of the stockholders of the Eads Ship Railway will be called on the arrival home of James Andrews, of Allegheny City, Pa., who is now the engineer of the company. Mr. Andrews is now in Mexico. The meeting will be held in Pittsburgh, where some thirty of the stockholders of the company live.

Coal in Colorado.

The output of the coal mines of Colorado for 1887 is estimated by the *Rocky Mountain News* at 1,436,200 tons, valued at \$3,375,000. It is said that one coal field, lying in Gunnison, Pitkin and neighboring counties, contains more coal than the entire known Pennsylvania coal region.



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EDITORIAL ANNOUNCEMENTS.

Contributions.—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to ALL DEPARTMENTS of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.

Advertisements.—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. We give in our editorial columns OUR OWN opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.

The control of the Terre Haute & Indianapolis road has passed, by sale of a majority of the stock, to the Cincinnati, Hamilton & Dayton, or to the Ives-Stayner party which controls the latter. The price is not given out; the total stock is \$1,988,150, so that at par less than \$1,000,000 would be required. The object of the purchasers is said to be the formation, in connection with the Cincinnati, Hamilton & Dayton, of a St. Louis line for the Baltimore & Ohio, the latter's control of the Ohio & Mississippi since the last election being weakened if not wholly lost. The chief interest lies in the effect the purchase may have on the Pennsylvania's control of its "Vandalia line" to St. Louis, the general supposition that the Baltimore & Ohio is behind the present bargain giving color to the statements that action will be taken if possible to force the Pennsylvania to relax its severity in keeping the Baltimore & Ohio out of New York City.

The Terre Haute & Indianapolis proper extends from Indianapolis only to the Illinois line, about 80 miles; the remainder of the line to St. Louis, consisting of the St. Louis, Vandalia & Terre Haute, 158 miles, which is leased to the Terre Haute & Indianapolis and the Pittsburgh, Cincinnati & St. Louis jointly. The Pennsylvania controls the latter and also the 158 miles of leased road, by ownership of a majority of the stock, so that it is in a position to have a good deal to say about the St. Louis connection, whoever controls the Terre Haute & Indianapolis. This joint lease was made in pursuance of an agreement which is understood to insure the operation of a continuous through line over the roads named, between Pittsburgh and St. Louis, and may contain other provisions protecting the Pennsylvania's interest, so that even with a hostile bedfellow the latter would doubtless have time to turn itself. Roads in that region are not profitable enough to warrant any one in carrying enmities to extreme lengths, so that with the Indianapolis & St. Louis parallel and other existing roads not much more circuitous the Pennsylvania would probably not, even in the last resort, have to do anything more savage than threaten to build a new line to Terre Haute in order to secure reasonable treatment.

In the *Railroad Gazette* last week was published an abstract of the argument of General Alexander before the Inter-state Commission in favor of the suspension of the fourth section of the law, and also a letter from Mr. Perkins, President of the Chicago, Burlington & Quincy, to the Iowa State Commission on the cost theory of rates. Both are interesting as giving some concrete illustrations of the effects in practice of recent legislation, and they carry important lessons. Not only those who make the laws, but the far greater number who more or less directly influence legislation should become familiar with the good that has resulted to the community at large from the system of rates which the latest laws are framed to overthrow, and not dwell merely upon the evils.

The point made by General Alexander, that when a railroad is left free to take new business at any rates that will pay a profit, the community served eventually gets the benefit of the additional net earnings of the road, is one very familiar to railroad men, but not so obvious to the public. The gradual reduction in the price of transportation is not so apparent as the discrimination. But as restrictions which cripple the railroads begin to react on the communities served the lesson will slowly come home that generally speaking the policy of the railroads has been wiser and juster than the policy which Congress and the state legislatures have tried to establish.

The inevitable failure of the attempt to ignore the effect on the whole Southern railroad system of the coastwise steamship trade is foreshadowed in General Alexander's argument. That the railroads can reduce local inland rates to the level of rates at points where there is water competition, and live, is not supposable. That the seaboard cities will be long in learning that the competition of the railroads with the water-carriers has well served their commercial interests is no more supposable. But it is highly probable that talking and writing will not alone bring about sufficient change in public sentiment to cause any modification of the law. The consequences of its enforcement will have to be felt.

The letter of President Perkins calls attention more directly to the effect that the cost theory may have on the development of the great food producing regions of the West. He says: "It has always seemed to me that the essence of railroad transportation lay in its tendency to lessen the influence of distance on prices, bringing all producers and all consumers near to each other." It is not very many years ago that wheat could not be carried 200 miles, and while Ireland starved corn was burned in Kansas. To-day Dakota, Russia and India compete in the food markets of the world, and while the wheat grower of Middle New York or of England suffers, humanity profits by the competition. When these great facts are considered the efforts to fetter commerce seem puny and transitory. One is tempted to think that they can scarcely survive the statement of their evils; but unfortunately history is full of examples of the persistence of just such harmful laws.

The engineman and conductor of the excursion train in which a score of people were killed in the Silver Creek collision last fall, have been tried for manslaughter at Jamestown, N. Y., and acquitted, the jury returning a verdict of not guilty. While there was doubtless a serious degree of negligence on the part of these men (as well as of some others, if we remember the circumstances correctly), the jury quite likely decided, as in so many similar cases heretofore, that the looseness of the rules or of the discipline divided the blame between the manager, the dispatcher and the respective trainmen to such a degree that a true apportionment of the guilt was impossible, and so gave the accused men the benefit of the doubt.

The letter on car service rates, which we publish this week, goes over the same ground, in considerable measure, that was covered by "Car Accountant" in the *Railroad Gazette* for May 27, but is published as showing the agreement of views from different standpoints, as well as for its presentation of other considerations. "Mac" propounds some troublesome conundrums, but toward the close of his letter indicates the direction in which we may hopefully look for their solution. Perhaps it would be well if some dictatorial giant could step in and cut the Gordian knot, even if it did hurt some one. If reform is postponed until exact justice can be had all around this may be the nightmare of a lifetime, as the coupler question is.

The Practical Man, whose letter appears in another column, points out the obvious objections to the electric brake as used at Burlington, namely, the extreme multiplication of small parts, each of which is very liable to derangement, and the difficulty of finding where the derangement is.

This is all true, but at the same time it must not be forgotten that there is but one absolutely conclusive proof of the pudding. We may reason ever so wisely, but while we are proving that the pudding is really not fit to eat, some other fellow may eat it. It is true that the delicate complexity of the electric attachment seems unworkable in practice, but it may work. Every one is familiar with the constant attention required by the telephone in service. The visits of the lineman are as certain as, and more frequent than, those of the gas inspector. The contact point must be scraped, the binding screws kept tight, the battery plates freshened up or something done at

nearly every visit. This being so it is impossible not to share some of the misgivings of the Practical Man. On the other hand, it should be remembered that the electric brake is not helpless or unserviceable if the electrical attachments fail to function. It still remains an efficient air brake. To be sure the Carpenter brake, as used at Burlington, was not adapted to release by air, but there seems to be no mechanical reason why it should not be, and in fact Mr. Carpenter, by one construction of his electro-air valve, does accomplish this. The delicacy and precision with which the brake pressure can be graduated, the minor advantages of sustained pressure in the train reservoirs and of quick release, and the tremendous advantage of simultaneous application of all the brakes of a long train must make one hope that the use of electricity in train braking will be found practicable.

THE PARTIES TO THE RAILROAD QUESTION.

Whenever a dispute arises between a freight agent and a shipper, nine-tenths of the world assume that the shipper represents the public, and that the freight agent represents the interests of a grasping monopoly which is trying in some way to subtract from the fund available for public enjoyment. The interests of the shipper are identified with those of the community; the interests of the railroad are supposed to be in direct opposition to them. It is this view of matters which is responsible for most of the errors of railroad legislation. Some of these mistakes are, of course, due to wrong notions with regard to railroad management and railroad economy; but wrong notions of public economy are probably responsible for a far greater number.

It is our purpose in this article to distinguish as far as we can the different interests involved in any dispute about railroad rates; to see how far the ultimate advantage of the general public coincides with the immediate demands of the shippers; and to draw such lessons as we can with regard to the public rights and public responsibilities of railroad managers.

The community whom the railroad serves may be roughly divided into three classes:

1. Those shippers who already have the railroad facilities which they need.
2. Producers who have not such facilities, but might have them if the railroad system were extended.
3. Those for whom the railroad brings its products to market—in other words, the great body of consumers.

These classes are, of course, not sharply defined. Many of the consumers are also shippers. But, in a general way, they represent distinct interests, and the third class represents the largest interest of all.

What line of policy on the part of the railroads will be for the interest of these three classes, respectively?

1. The shippers, as such, are interested in having charges as low as possible, and each individual shipper is specially interested in having his charges reduced as long as this can be done without interfering with the necessary facilities for traffic. This demand is the one which is most immediate and obvious. It can most readily take the form of a specific complaint in the newspapers, a specific case in the courts, or a specific bill for railroad regulation by the legislature.

2. On the other hand, those producers who have not yet any railroad within reach are anxious to have railroad profits high, so that the building of new roads and the extension of facilities may be encouraged. This interest, though less distinctly felt than the former, is none the less imperative. Where legislation has so far interfered with railroad profits as to check the growth of new lines, the evil has been so serious that the obnoxious laws have generally been modified or repealed. Sometimes there is a curious endeavor to compromise between the two interests. There have been cases where laws have been passed reducing rates on old roads, but exempting from their operation such lines as should be subsequently built.

3. The consumers, as such, have a double interest. They desire that the goods which they use may be put in their hands at as low a price as possible. Now, two things conduce to low price—low cost and large supply. In order that the cost may be low, the consumers naturally desire that rates for existing traffic should be low. But, on the other hand, in order that the sources of supply may be adequate, it is for the consumers' interest that railroad profits should be high enough to encourage investment of capital in new lines for the benefit of new producers.

We thus have not one public interest, but three distinct ones, which often conflict with one another. Meantime there is a similar conflict of interests within the railroad itself. The railroad investors, and especially the bondholders, desire that the property shall have a high permanent value in order to afford them full security for their holdings. On the other

hand, the directors and managers of the more speculative railroad enterprises are interested in having large immediate returns in order that the annual balance sheet may make as favorable a showing as possible. These two aims may readily conflict. If the favorable showing is made by tricks of accounting, it involves just so much reduction in the permanent value of the property. If the same end is secured by a short-sighted traffic policy, the result is even worse. Such a policy interferes with the development of local business which must in the long run furnish a railroad's surest custom. It tempts competition at those points where large traffic is obtained, and thus encourages the building of parallel roads which form a permanent menace to the investors. Whatever be the method adopted, the attempt to make hay while the sun shines, by charging high temporary rates, does more harm than good to the more legitimate railroad interests.

Instead of having two parties to the railroad question we have four or five. It is not a simple question of railroads versus public, but a complicated question, where the interests of the investors, the managers, the shippers, the remoter producers, and the consumers are often quite distinct from one another. When a conflict arises it is often hard to tell exactly what party represents either the railroad interest or the public interest. A short-sighted attempt to charge high rates to particular shippers for the benefit of the current income of the railroad interferes with the interests of the investors. A short-sighted attempt to reduce railroad charges on behalf of the local shipper injures those far larger sections of the public that demand extension of railroad facilities. Hundreds of instances will occur to any one who has followed the history of railroad traffic or railroad legislation. It is perfectly clear that in each of these cases the shippers do not represent the public interest, nor the managers the railroad interest. It is equally true, though perhaps not equally clear, that the permanent interests of the railroads and the public alike, in opposition to the short-sighted demands of railroads rings on the one hand or of particular shippers on the other stand very close to one another.

There is one point in which all parties have a common interest, and that is in the development of business. The shipper who can do more business, other things being equal, will make more money. The railroad which can do more business, other things being equal, will make higher profits. This will lead to the construction of new roads for the benefit of new producers; and will thus both directly and indirectly benefit the consumer by increasing the supply of marketable goods. But while there is thus a common interest, it is a constant source of dispute how far it is worth while to reduce rates for the sake of securing it. Down to a certain point, a reduction in rates usually means increased immediate net profits; for a certain distance beyond that point, it means temporary loss to the railroad, but probable increased future returns. Still further reduction, in spite of the increase of business, offers no hope of increased profit, but an actual diminution.

The point to which rates can profitably be reduced varies with different lines and with different articles. It varies with differences in operating expense; it varies still more with different possibilities for the growth of traffic. But it may be said in a general way that the tendency of uncontrolled railroad administration, where there is no prospect of competition, is to keep rates above the first point of division—that is to say, not to make reductions unless there is a prospect of pretty immediate and direct increase in the net earnings. It may also be said that the tendency of special legislation is to carry reductions in rates beyond the lower point of division; in other words, to reduce them so low that the future growth of traffic is not likely to make them really remunerative.

In opposition to both these classes, the two largest interests—the general public on the one hand and the legitimate railroad investors on the other—unite in desiring to have the rates fall between these two limits. This is obviously the case with the railroad investors. They are interested in making the property permanently profitable and useful. They do not desire a temporary high rate which shall interfere with its permanent efficiency or tempt construction of parallel lines. It is equally true of the great body of consumers or possible producers. They desire reductions in rates; but the moment that reduction begins to interfere with the efficiency or extension of the service they lose more than they gain.

It is because there is such a common interest that commissions like that of Massachusetts have been so successful. By representing the wants of investors and public alike, against the mistaken or short-

sighted claims of managers and shippers, they at once contributed to a true understanding of some of the problems, and enlisted on the same side the support of a great many people who had previously supposed that they had no common interests whatever.

In like manner a railroad manager who intelligently charges what the traffic will bear is a representative of the public interest. To charge what the traffic will bear is to reduce rates on those articles which give a corresponding increase in the volume of business. The fact that such an increase follows a reduction in rates is proof that such reduction was needed. If a reduction in charge on another article is not followed by a similar increase of business it is at least *prima facie* proof that such reduction was not needed. It shows that in one case the high rate checked the development of traffic and that in the other case it did not. The secret of combining high profits with low rates—in other words, of harmonizing as far as possible the different interests which we enumerated—lies in making the reductions where the growth of business will most rapidly respond to them. The attempt to force railroads, by legislation, to base their rates on cost of service is a direct interference with this process, on behalf of a particular set of shippers.

What happens when a reduction in rates is made without a corresponding increase in traffic? In the first place, the railroad profits are lowered and the incentive to railroad enterprise is thus diminished without corresponding increase of volume of business. The money which the railroad loses may go either to the consumers or to the producers. In the case of those articles where the supply will increase more readily than the demand—that is to say, in general, the case of luxuries—the consumers get the benefit. In the case of those articles where there is an elastic demand and a limited supply the money will go to the producers. At the time of the Hepburn committee investigation there was an active agitation for the reduction of rates on milk, to which the railroads finally yielded. What was the effect on the milk traffic? Was the business developed correspondingly? The most prominent fact visible to the public was the activity of a ring of milk shippers that tried to reap the whole benefit and resorted to deeds of violence to prevent the community from reaping any advantage.

But it is by no means wholly the fault of the public that this state of things is misunderstood or denied. Some railroad managers have acted in violation of these principles, and a still greater number, while really doing public service, have refused to admit their public responsibilities. Comparatively few roads have learned how cheaply they could handle traffic to advantage until they were forced to it by the stimulus of competition. They have granted favors to those points and those individuals who could press their claims most strongly; they have failed to grant them to others in similar circumstances; and, whether they were doing right or wrong, they have insisted that it was purely a matter of private business whether they made reductions or not. This is in every respect a most unfortunate position for a railroad manager to take. It does all the more harm when he is doing right, because it predisposes the courts in favor of an opposite policy from what he has pursued. If he gives a wrong reason for doing right somebody else will find right reasons for doing wrong. Railroad rates have gone farther and farther from the old system of tolls, because railroad economy demanded it and the public interest demanded good railroad economy. If the public interest had demanded bad railroad economy, it is probable that the old system would have been retained. The really strong position for a railroad manager to take is that in serving the permanent interests of the company, he is serving, as nearly as can be ascertained, the permanent interests of the public. If he serves the temporary interests of some inside ring, that furnishes a legitimate ground of complaint and a reason for interference by public authority. If, on the other hand, while really pursuing the policy which is best for the public, he declares that it is none of the public's business what he does, he simply gives a pretext for such interference, where there is no real reason for it. He voluntarily abandons a strong position for the sake of a weak one. If he ignores his wider responsibilities, he must not be surprised if the public ignores his legitimate claims and the legitimate interests of those whom he represents.

The Effect of the Interstate Law on Earnings.

It is yet too soon to more than guess at the influence of the law on earnings. The law has been so short a time in operation, and so many of the essential factors are still lacking, that no intelligent opinion can be formed. Besides the gross earnings we must have

the mileage, the passengers and the tons carried one mile, and the passenger and freight earnings separately. The true measures of traffic are its units—that is, the passengers and tons carried one mile. Without them the effect of rates in one period as compared with another cannot be known with sufficient accuracy for any valuable comparison.

For the want, therefore, of these units of traffic, which divided into the passenger and freight earnings respectively would give us the average rates received and determine definitely whether or not there had been an increase in them under the new tariffs based on the law, any opinion as to the causes affecting the earnings for April and May are only speculative.

The increase on gross earnings on 38 roads in January, 1887, compared with same month in 1886, was 20 per cent.; in February, 1887, over February, 1886, 7.9 per cent.; March, 1887, on 70 roads, over March, 1886, 16 per cent.; in April, 1887, over April, 1886, 15.1 per cent., as against an increase in mileage of 2.4 per cent., or, eliminating the factor of mileage and basing the percentages on the earnings per mile of road, we have the following: January, 1887, over 1886, 16.7 per cent.; February, 1887, over 1886, 3.2 per cent.; March, 1887, over 1886, 11.3 per cent.; April, 1887, over 1886, 10.4 per cent., and for the quarter ending March 31, 1887, over 1886, we find an increase of 14.8 per cent. From these comparisons it appears that there were regular increases in the gross earnings in the months prior to April, as well as in that month; in fact, the gains were greater in January and March.

Considering these facts in connection with the prospect of good crops, the large surplus of grain on hand, the recent export demand therefor, the increased demand for steel rails caused by the construction of new roads, the greater influx of immigrants, a large portion of whom have to be transported to the West, and the general prosperity of the country, it is probable that the increase in April, 1887, would have taken place, if the Interstate Commerce law had never been passed, though, as we said before, without the traffic statistics it cannot be definitely determined. These remarks are equally applicable to the earnings for May, which as yet are only reported for a few roads, and in the nature of things only approximated.

The question in relation to the application of rebate claims also has a bearing on this subject—whether such claims shall be charged to the earnings of past months, in which they originated, or to the earnings of the month in which they are vouchered.

In fact, it is doubtful whether a just conclusion can be reached in the matter until we have some of the annual reports containing full statistics; the next batch that is due being from the roads in the state of Ohio, where the fiscal year ends on June 30.

The law, it will be remembered, gives the Commission the power also to require annual reports, to arrange the form and designate the fiscal year. Inasmuch as the fiscal year of the National government ends on June 30, and the Commission has to report to the Secretary of the Interior on Dec. 1, it is possible the year will be made to conform to that date.

Discrimination against the summer season is one of the latest phases of legislative oppression. The Connecticut Sunday law draws the limit at sunrise, and it seems that the newspaper train which takes the New York Sunday papers to New England towns runs at such an hour that it can make its trips in perfect innocence and law abiding confidence in the winter, but in summer it must suspend business. For injustice this goes far beyond the famous "fourth section." Perhaps, however, all will be well. It is an acknowledged fact that the general activity of the American people is much stimulated in summer and depressed in winter, and in these days of paternal legislation it is quite fitting that the law makers should do something to restore an equilibrium. Fortunately—

"God sends country lawyers an' other wise fellers,

To start the world's team wen it gits in a slough."
But for their anxious care we might hurt ourselves.

Besides the efforts at railroad control in England there is a movement of no slight importance to secure new lines of water communication. The possibilities of the Manchester ship canal have already been discussed in our columns. A less ambitious but not less important project is that which looks to the increase of water communication between Birmingham and Bristol, at the mouth of the Severn. There is canal communication along this route at present, but the depth of water is so small and the various obstructions so great as to prevent it from being much used. It is now proposed to enlarge the canal from Birmingham to Worcester so as to admit of the passage of coasting vessels of two hundred tons, and to substitute a hydraulic incline for the present system of fifty-eight locks; to make use of the Severn River between Worcester and Gloucester; and to enlarge the ship canal below Gloucester in such fashion as to permit the passage of vessels of sixteen feet

draught throughout its entire length. The final result would be that the coasting trade would be brought to Birmingham direct, and that for sea going vessels but one transshipment would be needed. In other words, that canal communication of the very best class would be provided, reaching into the heart of the mid-land manufacturing district. It is estimated that the cost of the undertaking will only be £2,000,000, and it is believed that the interest on this sum could be readily met by very moderate tolls upon the traffic of which such a canal would be secure.

The Westinghouse automatic brake having been referred to, in a paper read by a Mr. Marshall before the (English) Society of Arts, as inferior to the non-automatic or straight air for use in descending long grades, Mr. Kapteyn, the English manager of the Westinghouse Co., publishes some letters from officers of the Union Pacific (South Park division), Northern Pacific, Atchison, Topeka & Santa Fe, and Denver & Rio Grande roads, testifying to the satisfaction with which they use the automatic exclusively, and concerning the severe service they require of it. On the "High Line district" and other difficult portions of the Union Pacific the first requirement concerning brakes is that "straight air must never be used." Since the automatic equipment was applied in 1884 to the entire equipment of the South Park division 74 engines and 1,300 cars, the Superintendent knows of no instance in which damage has resulted from its failure; which, considering the steepness of the grades there, certainly is high commendation of the workmanship of the apparatus and the care taken of it, not to mention the admirable principle of the brake itself; which, like Howe's truss, is sufficient to sustain the brake in spite of drawbacks, if need be.

The grades mentioned in these letters, include, as most of our readers understand, 80 miles continuous 211 ft. per mile on the Gunnison Line of the Union Pacific, 5 miles on the Atchison at the Raton Mountain 185 ft. per mile, 21 miles through the Marshall pass on the Denver & Rio Grande 211 ft. per mile, and three 10-mile sections on the Northern Pacific, at Missoula and other points in the Rocky Mountains, 138 ft. per mile. Since these letters were written the Northern Pacific has completed the switchback over the Cascade Mountains with grades of 290 ft. per mile.

As is well known, the automatic brake must, in practice, be either going on or going off, while in use for graduating the speed of a train down a grade, so that the partial pressure necessary to maintain the speed at a certain rate is exceedingly difficult to maintain, especially to a runner who is busy looking at the romantic mountain scenery surrounding him on every side, and therefore cannot afford to give the time and close care necessary to a frequent adjustment of the air; and undoubtedly Mr. Marshall had reference to this feature and to the facility with which the brake cylinders in straight-air working can be constantly replenished just enough to make good the losses from leakage, when he expressed his preference for the latter. But the question of safety is, of course, paramount, not only on steep and dangerous grades, but everywhere else, and the sensible railroad officer who prefers smoothness of running to security against disaster, as contrasted in these two patterns of brake, would be hard to find. If Mr. Marshall were to take a ride on top of a freight train down the tortuous windings of the pass that the Denver & Rio Grande has dug through the Rocky Mountains and named after him, he would be apt to think sometimes of what might occur if the train were to break in two or the speed get beyond control; and with a brake that gives a feeling of security against these dangers, the speed recorder would, we think, willingly be left to make as frequent or as sharp saw-teeth as it pleased.

The examination of freight car couplers by a committee representing a number of prominent roads, recently referred to in these columns, and which was expected to have taken place May 25, began in New York City June 7, Messrs. Shinn, Wilder, Meehan, Wells, Darwin and Chapman of the committee being present. Messrs. Haynes and Small were unavoidably detained in distant parts of the country. Capt. O. E. Michaelis, of the Watervliet Arsenal, who is to conduct the physical tests of the couplers, was also present.

The trials took place in "Wootton's yard," 502 East Twentieth street, a temporary 24 inch track having been laid, and the couplers being mounted on four-wheel cars about 4 ft. long, which have wheels about 10 in. in diameter and a wheel base of about 30 in. Each car has a coupler at one end about 4 inches higher than at the other, so that its behavior under unfavorable circumstances can be noted. The track has in it two curves, one of 288 ft. radius and one of about 69 ft., but the cars are so short that the working of the various couplers in actual service on sharp curves on cars 30 to 40 ft. long is not at all illuminated by the trials.

The couplers entered for the trials were the McKee, Barnes, Hain, Janney, Dowling, Thurmond, Browning, United States, Mark, Titus & Bossinger and Perry.

The trials were quite informal, the gentlemen of the committee simply coupling and uncoupling the cars on tangents and on curves, and making note of the facility with which couplers of other types or patterns could be coupled to. Notes were also taken of the weight and price and various other peculiarities of the different devices and also of the maker's claims in case anything new was brought out. The last four above named were tried on the afternoon of June 8, which concluded the outdoor tests.

A third track will soon be completed between Chicago and Aurora (37.4 miles) on the main line of the Chicago, Burlington & Quincy. The permanent way is laid down for the first 9 miles out of Chicago, and the work of setting back the

station buildings is nearly completed. The earthworks and the building of new abutments for the bridge is nearly completed.

While the Chicago, Burlington & Quincy thus finds its comparatively large amount of double track for a Western road (276 miles out of a total length of 4,036 miles at the end of 1886) is insufficient to accommodate an increasing traffic without undue delay, another road of very similar size, the Chicago, Milwaukee & St. Paul, has as yet only one track for the greater portion of its line between Chicago and Milwaukee. Only the first 15 miles out of Chicago are double tracked, though the traffic amounts to some 65 trains daily. The Rio accident has, however, caused the management of this road to consider the necessity of adopting split switches, clearly visible signals and some form of interlocking gear throughout their main line. With the advent of these safeguards, essential to the working of main line traffic, the completion of the double track between Chicago and Milwaukee will probably follow.

It is said that the Atchison, Topeka & Santa Fe, which now controls lines from the Kansas grain fields and from the Pacific coast to Galveston, Tex., is to establish lines of steamers from that port to New York and to Europe. Such a project has large possibilities and at the same time serious weaknesses. Freight traffic between New York and California has for several years gone largely by the "Sunset Route" of the Southern Pacific, the steamers from New York to Gulf ports successfully competing with the trunk lines in the matter of time; but whether there is business enough at paying rates for a new line to profitably strive for it is another question. Carrying grain to Europe depends so much on the profitability of the return trip to the same port that a place with small imports must always be at a disadvantage.

The statement comes from St. Paul that the Minneapolis & St. Paul has appealed to the state commission for relief from the effects of the long-and-short-haul clause of the state law enacted last winter. The Chicago, Burlington & Northern having almost no local traffic can make through rates as low as it chooses, and has doubtless taken advantage of the fact to keep enough below its competitors to take the through traffic. This, however, does not by any means imply rates at the competing points lower than have existed in the past, or so low. The road with no local traffic is in the condition of a water route, or of the Canadian Pacific in reference to the Pacific coast business. It can keep just below its competitor, and still above the old through rate; and while the shipper pays more money than in the past, for very likely an inferior service, and while the road with local traffic is barred out, the unrestricted line is making more than ever before. Or, as has been said, the law imposes a penalty on competition.

In the consolidation engines of the Chicago, Burlington & Quincy, the first and fourth pairs of drivers are flanged, not the first and third, as has been stated. Mr. Kidder, Road Foreman of Locomotives, writes: "It will be obvious to you that one of these engines would cut a sorry figure backing over cut-offs and switches with blind tires on rear drivers."

Lake rates on June 5 advanced to 4 cents on corn and 4½ on wheat, Chicago to Buffalo, the persistence of the shippers in adhering to lower rates having kept vessels away until higher figures had to be offered to get boats away from the ore ports.

The grade crossing question still agitates the Connecticut Legislature, the last proposition, reported by a conference committee, being a bill requiring 250 of the more dangerous crossings to be removed at the rate of at least 2 per cent. and not over 10 per cent. a year. The railroads must pay at least 40 per cent. of the cost and 3 per cent. additional for each one per cent. dividend paid. The state pays the rest.

Dividends in Connecticut last year averaged 4.43 per cent., which would make the average proportion of cost to be paid by the roads about 53.3 per cent. A road paying 10 per cent. like the New York, New Haven & Hartford would have to bear \$7,000 of the cost of a \$10,000 change. Where there are several kinds or grades of stock, as in the case of the New York & New England, which last year paid a dividend on \$1,900,000 preferred stock only, a question would probably arise as to the rate of dividend to be used as a basis.

The attention of readers of the *Railroad Gazette* is called to the "Notes of Legal Decisions" which we have been publishing for several weeks past. The purpose of this department is to present a complete and systematic view of the decisions of the Supreme Courts of the states and territories as well as of the Federal Courts, on all questions concerning railroads, or in which a railroad is a party. In this department our subscribers may rely on finding, from week to week, every current decision made in any American court of authority, which can affect in any way, or which announces any doctrine affecting the rights, powers and liabilities of railroads. This department is in charge of a well-known legal author—a writer who has given much special study to the law of corporations and of common carriers. It will be found of real value.

The current number of the *Forum* devotes 15 pages to a paper on "Passes and the Public." The arguments, naturally, are not new; one could not expect new arguments on so well worn a theme. Singularly enough, the writer omits any discussion of the ethics of passes to "the press," but all other public servants, from President down to policemen, are reminded of the impropriety of accepting them. He makes a point of the utility as well as the immorality of wasting the

revenues of a railroad in free transportation. "The president of one of the foremost railroads of the country recently said that he saved his company thousands of dollars a year by giving annual passes to county auditors. He was mistaken. The property of his company is, and for years has been, taxed on a higher basis than property belonging to individuals, in every county of several states in which his railroad is located. It is a good sign to see popular discussion on this side." The newspapers have so generally shared in the demoralization of ideas on this subject that they have done little to make or to express a correct public opinion concerning it. Paying fares may clarify the notions of the editors.

It appears that the Mobile & Ohio has drawn the color line in the excursion rates to the meeting of the Knights of Labor in Mobile on Aug. 8. The ticket is stamped "colored," so that none but colored men can avail themselves of the rate. The company argues that none but colored men will want to go to Mobile in August, but from some sources there come charges of discrimination against the whites.

The plan of the road seems to be to take colored Knights of Labor at reduced rates, and to take all other colored persons at the same discount, because there are so few of them that it is cheaper to take them than to go to the trouble and expense of making delegates show credentials. This is doubtless technically a discrimination, for if the reduction is for delegates only, the voluntary leaving of a loop-hole where a certain class can avail themselves of it while other classes cannot do so, is unfair, even if few or none embrace the opportunity offered; though the railroad would doubtless bring strong circumstantial evidence to prove that any colored person who could raise sufficient funds to visit Mobile would also surely possess enough political and social influence in the community to get himself chosen as a delegate to the convention.

Mr. G. F. Wilson, Master Mechanic of the Minneapolis & St. Louis, lately issued the following notice:

"The Vice-President [W. H. Truesdale] has instructed that there be no Sunday trains run this summer, unless absolutely necessary. The object is to avoid doing Sunday work as much as possible. Engineers are instructed to report no work to be done on Sunday, excepting in cases that are absolutely necessary. Foremen are instructed to do no work in shop on Sundays that can be done through the week, excepting in cases of extreme necessity."

This notice differs from many of its kind, in the fact that its spirit seems to be that of those who "mean business." The object of the order is plainly stated and the word "extreme" is an important qualification. In many orders of this kind the object, as may be read between the lines, would run something like this, "to quiet old fogey critics and at the same time keep even with our competitors, who, we fear, will roll up wealth one-seventh faster than we shall."

In matters of this kind all depends upon whether those interested really desire to work fast enough during six days so that they can afford on the seventh to rest for their own benefit, and remain quiet for the benefit of their neighbors, or on the other hand are so anxious to get their life work done in good time that they feel unable to afford time to lie off regularly. And with an officer the efficiency of his motives depends very largely on the means he takes to infuse them into his subordinates.

Record of New Railroad Construction.

Information of the laying of track on new railroad lines in 1887 is given in the current number of the *Railroad Gazette* as follows:

Arizona Mineral Belt, from Flagstaff, Ariz., southward, 18 miles.
Denver, Memphis & Atlantic, since Jan. 1, 123 miles.
Fort Worth & Denver City, northward from Quanah, Tex., 50 miles, 16 miles since last reported.
Montgomery & Florida, from Montgomery, Ala., southward, 50 miles; since last reported, 20 miles.
San Antonio & Arkansas Pass, from San Antonio, Tex., to the Colorado River, 150 miles, 9 miles since last reported.
Shell Beach, from New Orleans to Point-a-la-Hache, La., 30 miles.
Southern Pacific, from Ventura, Cal., towards Santa Barbara, 9 miles.

This is a total of 225 miles for the week, making 1,584 miles reported thus far for the current year. The new track reported to the corresponding date for 16 years has been:

Miles.	Miles.	Miles.	Miles.
1887.....1,584	1883.....1,830	1879.....682	1875.....312
1886.....1,108	1882.....3,677	1878.....532	1874.....570
1885.....635	1881.....1,754	1877.....583	1873.....1,271
1884.....1,032	1880.....1,613	1876.....687	1872.....2,026

This statement covers main track only, second or other additional tracks and sidings not being counted.

NEW PUBLICATIONS

The Civil Engineer's Pocket Book. By John C. Trautwine, C. E. Eleventh edition, twenty-seventh thousand. John Wiley & Sons, publishers, New York. Price, \$5.

In the preface to this edition the editor informs us that it contains revised formulae for thicknesses of cylinders under internal pressure; a revised table of thicknesses for cast-iron pipe; additional tables of co-efficient "c" in Kutter's formula, and a new and fuller table of values of foreign coins. Mr. Pegrarn's suggested uniform loading for railroad bridges, condensed from the Transactions of the American Society of Civil Engineers, June, 1886, is also given as additional matter. The formulae for approximate weight of truss bridges have been revised, and a number of minor changes have been made.

The Economic Theory of the Location of Railways. By

A. M. Wellington, C. E. Revised and enlarged edition. John Wiley & Sons and *Engineering News*, publishers, New York. Price, \$5.

The first edition of this work was published in 1877 and long ago exhausted. For several years we have been promised this revised edition, which now appears rather as a new work than as a revision, for the author states that every page and sentence has been rewritten, except the dedication. The present edition contains 950 pages, besides a most elaborate index of 30 pages. We hope to give a more extended review of the work in a future issue.

The Burlington Brake Trials.

Since our last issue some further trials have been made at Burlington with the Westinghouse brake in order to discover if it were possible to make emergency stops without shock when the brake valves are set by air alone.

These trials lasted three days, Mr. G. W. Rhodes and Mr. Benjamin Welsh being the members of the committee present. The shocks with trains of 20 cars were mild, but with trains of 30 cars under similar conditions, the slidometer moved 23 inches. The distance in which the train was stopped was about the same in each case, 155 ft. at 20 miles per hour and 505 ft. at 40 miles per hour.

The shocks seem intensified when the engine driver-brake is made with considerable leverage, and the application of a relief valve to the driver-brake cylinder lessened the shocks and improved the stops at slow speeds, but lengthened the stops at high speeds. This relief valve is set at a certain pressure and gradually releases the air out of the cylinder during the stop, until the pressure falls to the amount at which the valve is set.

When the length of stop was slightly increased, the shocks with trains of 22 and 24 empty freight cars were not excessive, the slidometer moving only from $4\frac{1}{2}$ to $9\frac{1}{2}$ in. The train was stopped at 20 miles per hour in about 170 ft., and at 40 miles per hour in about 570 ft. The train pipe pressure varied from 68 to 70 lbs. in these stops, and 53 to 54 lbs. was reached in the cylinders. In the rear car the pressure in the cylinder rose to 35 lbs. in $3\frac{1}{2}$ seconds after the brake was applied on the engine.

Various alterations were made in the brake, and their effects in lessening the shock were tried with trains not exceeding 30 cars. The passages in the quick acting triples leading from the brake-pipe to the cylinder were enlarged to $\frac{1}{2}$ in. diameter. It was anticipated that this would materially quicken the action of the brake by allowing the air to escape from the pipe in less time than at present. A lighter spring was also placed in the triples. Some alterations in the size of the holes or ports in the upper slide valve in the triple had been already made before the trials reported in the last issue of the *Gazette*.

The net result of these experiments appears to show that shock can be avoided with a train of 20 or 24 cars when the train pipe pressure does not exceed 70 lbs. and the driver brake is so arranged that it does not act with undue power. A slight increase of pressure and in length of train at once quadrupled the movement of the slidometer, showing that the shock rapidly becomes a very formidable feature with trains above a certain length. At present the limit seems to lie between 24 and 30 cars.

THE SCRAP HEAP.

Quick Work.

The Adams Express men claim that a carload of strawberries was recently transferred by them at Cincinnati from an L. & N. to a Pennsylvania car in nine minutes. The number of crates handled was nearly five hundred.

An Impending Strike.

The employees of the different mills of the Reading Iron Works, Reading, Pa., have notified the management that they will not accept the proposed 10 per cent. reduction announced to take effect June 13. If the reduction is enforced a strike is probable.

The Findlay Boom.

Findlay is celebrating the anniversary of the discovery of natural gas, and takes occasion to do some advertising on the occasion. Besides governors, processions, gun firing, competitive drills, for prizes amounting to \$2,750 in the aggregate and an illumination of the town, they drive the last spike for their belt railroad and lay the first rail for their electric railroad. But the crowning glory of the occasion will be the laying of corner stones, by the masonic body, for the following mills and works, viz.: The Le Grange Rolling Mills, the Ohio Coil & Cable Chain Works, Moore's Chair & Furniture Factory, the Union Boiler Works, the Findlay Door, Lash, Blind & Planing Mill Company, and the Ohio Lantern Works. The works already established at Findlay since the discovery of gas are: The Briggs Tool & Iron Works, which has been so successful that they have organized the Briggs Rolling Mill Co.; The Findlay Iron & Steel Co.; The Union Boiler Works; three furniture and wood-working companies; an oil refinery; The America Aluminum Works; The Ithica Glass Works; the Columbia Table Glass Works and the Findlay Window Glass Works. This last company are building to more than double their capacity, proposing to have the largest window glass factory under one roof in this country. During the past year a thousand houses have been erected, and about the same number are now under contract, and the population has increased from about 6,000 to 10,286 two weeks ago. If the city can keep this percentage through a decade it will doubtless become, as its *Daily Courier* predicts, "the greatest manufacturing centre of this country, if not of the world."

Bolan Pass Railway.

The *Indian Engineer* has the following notice of Indian railroad extension:

"The Bolan Railway for 120 miles has been opened over the Pass, and is now being utilized by passengers from Rindhi to Quetta; i. e., for about 80 miles, although the traffic so far is not very great, as the majority of the hill tribes still prefer making the journey on foot, which takes about as many days as it would hours by rail. At Hirokh, which is 4,500 ft. above sea level, the broad gauge ends, and 9 miles miles of narrow gauge ghat-line continues over the summit

of Pass, at an elevation of 5,600 ft. above sea level: at this point the line again changes into broad gauge for 25 miles, terminating at Quetta. The next changing station is called the 'Kotal.' It is mooted that the narrow gauge will be converted into broad gauge, which alteration would occupy the better part of a year, cost about 15 lakhs, and would necessitate the rails of the steep part, say, 3 miles, being fitted with the rack-rail for special clog-wheel engines. It is to be regretted that the expenses for construction amounted to double of what the line might have been laid down for."

This Bolan Pass road is built as a strategic line to head off the Russian advance to Herat.

Fast Time, Rock Ballast, etc.

Some Ansonia people engaged, as they supposed, a special train on the New Haven & Derby road the other day to take them to a convention at New Haven. The train left Ansonia at 11 o'clock and stopped at Derby $4\frac{1}{2}$ hours to take on a circus. The train was just $5\frac{1}{2}$ hours in going 10 miles.—*Exchange*.

Car Float Sunk.

About two o'clock on the morning of June 8, as the New York, New Haven & Hartford Railroad Co.'s tug *Transfer No. 2* was towing a float with eight box-cars loaded with freight up the East River, an unknown craft struck the float, making a hole in its side through which the water began to run rapidly. The captain of the tug headed for the slip near Hunter's Point ferry, and as he entered it the float sank, and all of the cars went down except three. The loss is estimated at about \$15,000.

A Runaway in India.

A native station-master on the East Indian Railway recently telegraphed as follows regarding three goods trucks which had started off down a neighboring incline: "Three goods waggons absconded. Please send enquire to make arrest."

One More Train Robbery.

The Texas & Pacific east-bound mail and express was stopped by four masked men at Ben Brook, 10 miles from Fort Worth, Tex., on June 4, and \$1,350 were extracted from the express car. Dogs and sheriffs started as soon as possible on the track of the guilty ones, and according to last accounts the outlook was most auspicious—for the robbers.

Italian Railroads.

Signor Garacco, the Italian Minister of Public Works, has deposited in the Italian Chambers a bill relating to the construction of further Italian railways to be assisted or established by the State. By the terms of Signor Garacco's bill, \$4,840,000 will be devoted during the financial years 1886-7, 1887-8, 1888-9, 1889-90 and 1890-1, to the completion of works now in hand; \$2,100,000 will be applied to the establishment of a direct line between Rome and Naples, to be completed in three years; and \$2,000,000 to the establishment of a line between Genoa, Ovada and Asti, to be completed by 1892. A rather important tunnels occurs on this last mentioned line.

TECHNICAL.

Locomotive Building.

The Grant Locomotive Works are building ten 8-wheel passenger locomotives for the Union Pacific.

The Car Shops.

The Laconia, N. H., Car Co. has just delivered 5 passenger cars and one combination car to the Boston, Revere Beach & Lynn road.

Bridge Notes.

The contract for the draw of the new railroad bridge over the St. Mary's River at the Sault Ste. Marie, Mich., has been let to the Detroit Bridge & Iron Works. The length of the draw is 398 ft. It will be moved by steam, and may be opened or shut in $1\frac{1}{2}$ minutes.

The Gloucester County, N. J., Board of Freeholders has decided that the new bridge which is to be built over the Raccoon Creek, between Swedesboro and Bridgeport, shall be 140 ft. long, 16 ft. wide, with an 88-ft. draw. Estimates for both an iron and a wooden structure will be asked for from builders.

A new iron bridge of 150 ft. span over the Delaware, Lackawanna & Western Railroad and Morris Canal, near Hopatcong station, will be built on the new road leading from Drakesville to Lake Hopatcong, N. J.

Iron and Steel.

The East Birmingham Iron & Steel Co. has organized in Birmingham, Ala., and expects to begin the erection of a plant as soon as arrangements can be perfected.

About 75 tons of Bessemer steel are poured daily and rolled into rails at the Roane Iron Co.'s works at Chattanooga, Tenn. Another converter is to be immediately added.

The Hartman Steel Co. has ordered two machines for straightening 5-inch steel shafting from William Todd & Co., Youngstown, O.

Stack No. 1 of the Lehigh Iron Works at Aineyville, Pa., was fired last week, after having been enlarged and improved.

It is reported that the Swede furnace, the largest in the Schuylkill Valley, will go into operation this week. Carnegie Bros. & Co. have just rolled 600 tons of bridge iron for Galveston, Tex., and 1,300 tons of structural iron for the state building at Denver, Col.

A company to be known as the Bridgeport Rolling Mill Co. will soon commence the manufacture of iron, steel, copper and their products at Bridgeport, Conn.

The Sneed & Co. Iron Works, of Louisville, Ky., have been awarded the contract for all the iron-work, excepting the beams, of the Chicago Auditorium, Chicago, Ill., amounting to 3,600 tons of wrought and cast iron. The price is between \$250,000 and \$300,000. Messrs. Carnegie Bros. & Co., of Pittsburgh, will furnish the beams required.

The Reading Iron Co., of Reading, Pa., has announced a reduction in wages of ten per cent., to begin on June 13.

The Rail Market.

Steel Rails.—There have been a number of sales of 1,000 to 2,500 ton lots. A sale of 10,000 tons reported to have been made by an eastern mill to a Southwestern road is off. Quotations, \$38@39 at eastern mill, with foreign rails at \$40 at New Orleans.

Old Rails.—The market is firmer, \$21@21.25 for tees and \$21.50 for double heads.

Scrap.—Dull market, foreign offered at \$20@20.50 and yard scrap at \$22@22.50, with choice lots available at \$23.

Rail Fastenings.—Spikes, 2.40@2.50c. net; angle fish bars, 2.15@2.25c.; steel angle bars, \$2.25@2.30; bolts and nuts, 3.10@3.20c.; and bolts and hexagon nuts, 3.25@3.30c.

Manufacturing and Business.

The Carlisle Manufacturing Co., Carlisle, Pa., has ordered 200 United States Couplers to put on cars now building for the Burton Stock Car Co.

Walter W. Davin & Co., of Birmingham, Ala., sold last week two 40 horse-power stationary tubular boilers to the

De Bardeleben Coal & Iron Co., one 25 horse-power portable engine and boiler and one 6-in. centrifugal pump to the Elyton Land Co.

The Yale & Towne Manufacturing Co. has transferred to William Sellers & Co., of Philadelphia, the business of building testing machines on the Emery system.

The Curtis Regulator Co., Boston, Mass., report the following sales in April: Steam regulators from 1 to 5 in., return traps, damper regulators, expansion traps, pump and water regulators, and carbonic acid gas regulators. Massachusetts, 39; Connecticut, 1; Rhode Island, 1; New York, 20; Pennsylvania, 4; Ohio, 1; Minnesota, 2; Nova Scotia, 2; Copenhagen, Denmark, 1; besides 9 for the car heating system of the Baltimore & Ohio and other railroads.

The Alabama Rolling Mill Company, Birmingham, Ala., have ordered three Porter-Hamilton engines—300, 460 and 500 horse-power—from William Todd & Co., Youngstown, Ohio.

A raw-hide dust guard patented by William McKenzie, of Boston, has been in use on the Boston & Albany, the Old Colony and Boston, Revere Beach & Lynn road for nearly a year and a half.

The Suez Canal in 1886.

The annual report of the business done in 1886 shows that quite a falling off has occurred in the traffic through the Suez Canal. The number of ships passing through was 3,100, against 3,624 the previous year. The net tonnage of the vessels was 5,767,655 tons, against 6,335,752 tons in 1885. The receipts in 1886 were \$2,261,095, against \$2,488,297 in 1885. Since 1883 a steady falling off has been shown in the receipts from traffic. This has been due chiefly to the reductions in dues and the abolition of many charges on traffic. The result appears to be that lower rates on traffic have not been the means of increasing the business done yearly. Of the total tonnage 77 per cent. was British. The French and Italian traffic showed a decrease during the year, while that of Germany showed an increase. The canal is now lighted by electricity at night, and the time of passage through it has been decreased from 36 to from 16 to 20 hours.

California as a Petroleum Producer.

California is becoming more important yearly as a producer of petroleum. The *San Francisco Chronicle* gives some figures of production which show that in 1886 there were obtained there 10,950,000 gallons. The industry is still young. The year 1879 is given as the first year of liberal production, when a little over 500,000 gallons were produced. Since then the increase has averaged something like 1,000,000 a year. Much activity prevails at present in the petroleum fields of Southern California. A pipe line from one well to a railway station has just been completed and another one from the petroleum fields to Los Angeles is talked of.

Iron Industry of Cleveland.

Cleveland, besides handling a large part of the Lake Superior iron ores, has about \$26,300,000 invested in iron works, employing 17,950 men and producing products to the value of \$31,650,000 in 1886, according to the report of the Cleveland Board of Industry. Forty-nine per cent. of this is classified as iron and steel products, 12 per cent. as hardware, tools, etc., and 8 per cent. as sewing machines.

There are only two firms that produce iron from the ore, viz.: the Cleveland Rolling Mill Co. and the Union Rolling Mill Co. The output of the first for 1886 was:

	Tons.	Value.
Steels and rails.....	100,000	\$3,600,000
Pig iron.....	150,000	3,000,000
Merchant steel and plate.....	50,000	2,750,000
Wire.....	40,000	2,400,000
And that of the Union Rolling Mill was:		
Pig iron.....	40,000	\$800,000
Finished bar iron.....	25,000	1,000,000

According to the *Iron Trade Review* of that city, Cleveland is fast losing its prestige as the heaviest ore receiving port on the Lakes, due to the diversion of the business to other ports. A special committee has been appointed by the Board of Industry to investigate the cause of the decline.

Machine for Rolling Car Wheels.

Mr. Theodore W. Bean, of Morristown, Pa., has patented a machine for "producing car wheels of compressed and rolled steel." The ingot is placed between two inclined roll-heads, of proper form, and a third roll moves by friction against the periphery of the ingot. The wheel is formed by one operation.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Cincinnati, Hamilton & Dayton, annual meeting, Cincinnati, O., June 21.

Fort Worth & Denver City, special meeting, Fort Worth, Tex., June 22.

Cumberland & Piedmont, meeting, Cumberland, Md., June 10.

Ogdensburg & Lake Champlain, annual meeting, at the office, Ogdensburg, N. Y., June 15.

Oregon Railway & Navigation Co., annual meeting, Portland, Oregon, June 20.

St. Paul & Duluth, annual meeting, at the office, St. Paul, Minn., June 20.

Illinois Central, meeting, Chicago, June 17.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Belfast & Moosehead Lake, 3 per cent. on preferred stock and $1\frac{1}{2}$ per cent. on common stock.

Boston & Lowell, $3\frac{1}{2}$ per cent., payable July 1.

Central, of Georgia, 4 per cent., payable June 22, to stockholders of record on June 10.

Connecticut River, 2 per cent., quarterly, payable July 1, to stockholders of record June 15.

Denver & Rio Grande, $2\frac{1}{2}$ per cent. on preferred stock, payable July 12, to stockholders of record June 30.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Master Car-Builders' Association* holds its annual convention at Minneapolis, Minn., June 14.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 15 Washington street, Chicago, at 7:30 p. m., on the first Tuesday of each month.

The *American Society of Civil Engineers* holds its annual convention at the Hotel Kaaterskill, Hudson River, N. Y., the first week of July.

The *American Railway Master Mechanics' Association* holds its annual convention in St. Paul, Minn., June 21.

The *American Association of Train Dispatchers* holds its annual convention in Boston on June 16.

The *Traveling Passenger Agents' Association* holds its annual convention at Old Point Comfort Va., on June 14.

PERSONAL.

—Ridgely Cayce has resigned the position of paymaster of the Mobile & Birmingham.

—William Biddle, who was President of the Mine Hill & Schuylkill Haven Railroad Co. for 15 years, died in Philadelphia on June 7.

—M. S. Wasson, Division Freight Agent of the Indianapolis & St. Louis, has resigned, after a service with this company of 24 years.

—Mrs. Frank Thompson, the wife of the first President of the Pennsylvania road, and the eldest daughter of Benjamin G. Clarke, of New York, died at Elberon, N. J., on June 2.

—Superintendent E. G. Allen, of the New York, New Haven & Hartford, has been presented with a diamond ring, a gold headed umbrella and a handsomely engrossed testimonial by 330 employes of the New York & New England, from which company Mr. Allen recently resigned.

Marvin Hughitt, just elected President of the Chicago & Northwestern, entered the railroad service in 1853 as telegraph operator at a small station on the Chicago & Alton. Subsequently he became passenger conductor and chief train dispatcher. He was with the Illinois Central, the Pullman Palace Car Co., and Chicago, Milwaukee & St. Paul during the time between 1862 and 1872. He then became General Superintendent of the Chicago & Northwestern, and in May, 1876, assumed the duties of General Manager. Since June, 1880, he has been Second Vice-President and General Manager. Mr. Hughitt is also President of the Chicago, St. Paul, Minneapolis & Omaha.

ELECTIONS AND APPOINTMENTS.

Atlantic & Pacific.—The Executive Committee elected on June 7, 1887, for the ensuing year is composed of H. C. Nutt, B. P. Cheney, W. B. Strong, Jesse Seligman, E. F. Winslow. The officers elected are: H. C. Nutt, President; E. F. Winslow, Vice-President; W. B. Strong, Second Vice-President; H. W. Gardiner, Secretary and Treasurer; F. E. Hancock, Acting Auditor; C. W. Smith, General Manager Western Division; H. L. Morrill, General Manager Central Division.

Baltimore & Ohio.—S. B. Crawford has been appointed Master Mechanic at Mount Clare; John Adair, Master Mechanic at Grafton, and F. Frazise, Master Mechanic of Philadelphia Division.

Baltimore & Potomac.—At the annual meeting this week the following directors were elected: Frank Thomson, Geo. Small, W. T. Walters, B. F. Newcomer, E. J. Henkle, Samuel Cox, Jr., R. D. Barclay. Officers: Hon. Oden Bowie, President; Frank Thomson, Vice-President; John S. Leib, Treasurer; Jas. P. Kerr, Secretary.

Billings, Clarke Fork & Cooke City.—At the annual meeting in New York this week the following directors were elected: Chas. F. Roberts, George N. Sims, George B. Hulme, of New York; Henry Kelly, of Philadelphia, and P. M. Gallaher, of Danville, Pa. Officers were elected as follows: Chas. F. Roberts, President; P. M. Gallaher, Vice-President and Chief Engineer; George N. Sims, Treasurer, and George B. Hulme, Secretary.

Boston & Lowell.—H. E. Folsom is appointed Superintendent of the Passumpsic Division, formerly the Connecticut & Passumpsic Rivers road. The authority of the general officers of the Boston and Lowell is extended over this division.

Boston & Providence.—Samuel L. Minot has been appointed head of the newly-established department of Maintenance and Construction, with the title of engineer. He will have charge of all bridges, buildings and tracks.

Canadian Pacific.—J. G. Ogden has been appointed Comptroller; H. L. Perry, Auditor of Disbursements; Charles J. Flanagan, Auditor of Freight and Telegraph Receipts; John H. Shearing, Auditor of Passenger Receipts. H. J. Colvin has been appointed Boston Passenger Agent.

Chenango & Allegheny.—A. S. Dunham has been appointed General Superintendent, with headquarters at Greenville, Pa.

Chesapeake & Delaware Canal.—At the annual meeting this week the following directors were elected: J. V. Williamson, Edwin Swift, Charles H. Hutchinson, Mahlon P. Hutchinson, Henry C. Ford, Hood Gilpin, Peter C. Hollis, William H. Drayton, David Scull, Thomas McKean, Andrew Gray, John Cadawader, Moncure Robison, Jr., Joseph E. Gillingham was elected President.

Chicago, Milwaukee & St. Paul.—At the annual meeting the following directors were elected: Frank T. Bond, George C. Magoun, Peter Geddes, Hugo T. Dickey, James Stillman, William Rockefeller, James T. Woodward, Joseph Milbank, A. Van Sartovder, all of New York; Selah Chamberlain, Cleveland; Philip Armour, Chicago; John Plankinton, Milwaukee, Wis.; J. C. Easton, La Crosse, Wis. No action was taken in regard to filling the vacant presidency.

E. W. McKenna has been appointed Superintendent of the Prairie du Chien and Northern Divisions vice Sumner Collins, who is appointed Superintendent of the Kansas City Division.

Chicago & Alton.—J. W. Donald has been appointed City Passenger Agent in Boston.

Chicago & Northwestern.—Marvin Hughitt has been elected President of this company.

Chicago, Rock Island & Pacific.—The Keokuk and Des Moines division and the Des Moines & Fort Dodge Railroad are now operated as one division, known as the Des Moines Valley Division. C. N. Gilmore has been appointed Superintendent of the same.

Chicago, St. Paul, Minneapolis & Omaha.—At the annual meeting this week the old officers were re-elected. The changes made in the directory were the election of David P. Kimball, of Boston, in place of Gen. D. W. Washburn, and John A. Hunter in place of J. D. Howe.

Chicago, St. Paul & Kansas City.—Raymond Du Puy has been appointed General Manager, and J. A. Hanley, Traffic Manager.

Consolidated Transit Co.—The incorporators of this Philadelphia elevated railroad company are John Wanamaker, Thomas Dolan, John Lowber Welsh, Joseph B. Altman and Henry C. Gibson.

Denver, Garden City & Southwestern.—The directors are: John Stevens, C. J. Jones, D. C. Bridges, C. E. Merriam, J. T. Nelson, J. R. Holmes, E. C. Gibson, E. A. Bigby, J. W. Gregory, J. S. Painter and D. C. Menke.

Denver Junction, McAllister & Southeastern. The directors of this new Kansas company are: A. L. Williams, H. P. Dillon, Geo. W. Venle, Charles Monroe, D. C. Lockwood, G. A. A. Deane, Lester S. Wilson.

Fall River, Howard & Western.—The incorporators of this new Kansas company are: R. F. Glenn, T. S. Fuller, George

W. McKey, Asa Thompson, J. S. Roth, Stephen Chandler and W. H. Pyle, of Howard; J. F. Walters and O. E. Aldrich, of Western Park, Kan.

Fort Smith, Howard & Northwestern.—The incorporators of this new Kansas company are: S. C. Hannah and D. L. Campbell, of Howard; I. H. Patterson and W. M. Coventry, of Longton; C. W. Rambo and Oley Richardson, of Elk Falls; K. H. Borrockman, of Union Centre; W. L. Craig, of Western Park; P. Holmes and Sam Gardner, of Oak Valley, Kan.

Fort Worth & Rio Grande.—A. R. Zabriskie has been appointed General Freight Agent and Auditor.

Garden City Nickel Plated.—The directors of this new Kansas company are: J. A. Stephens, C. J. Jones, D. C. Bridges, S. S. Painter and E. A. Bigby.

Louisville & Nashville.—H. F. Smith has been made Assistant Superintendent of the South and North Alabama Division of this road, with headquarters at Birmingham, Ala.

N. M. Newbold has been appointed Assistant to the General Manager, vice Wm. Alfred Kelland, resigned.

Louisville, New Albany & Chicago.—R. W. Glading has been appointed Purchasing Agent, in place of A. S. Dunham, resigned.

Louisville Southern.—J. G. Motley has been appointed Chief Engineer.

McPherson, Texas & Gulf.—The directors of this new Kansas company are: A. L. Williams, H. P. Dillon, Charles Mulvaney, A. S. Loomis, Topeka; G. A. A. Deane, Lincoln; W. W. Clarke, Harper; W. P. Olmstead, J. B. Forbes, Anthony; Geo. D. Thompson, Harper.

Midland, McPherson & Northern.—The directors of this Kansas company are: J. O. Davidson, J. B. Dacy, O. H. Bentley, W. E. Stanley, Wichita; H. B. Kelley, McPherson.

Midland & Western.—The directors of this Kansas company are: J. O. Davidson, J. B. Dacy, O. H. Bentley, W. E. Stanley, Wichita; S. W. Campbell, Hutchinson.

Minneapolis & St. Louis.—George E. Smith has been appointed Assistant General Freight Agent.

Mobile & Birmingham.—E. B. Thomas has been appointed General Manager.

Pekin & Danville.—The incorporators of this Illinois company are: C. W. Fairbanks and Otto Gresham, of Indianapolis, Ind.; E. L. Stewart, J. B. Mason and Will Seackwith, of Danville, Ill.

Pennsylvania Company.—The annual meeting held in Pittsburgh this week resulted as follows: G. B. Roberts, H. H. Houston, Wistar P. Morris, Edmund Smith, H. D. Welsh, J. N. DuBarry, J. P. Wetherill, A. J. Cassatt, John P. Green, and W. H. Barnes, of Philadelphia; J. N. McCullough, William Thaw and Thomas D. Messler, of Pittsburgh.

Pittsburgh, Fort Scott & Chicago.—The incorporators of this Kansas company are: Charles A. Mair, Charles C. Copeland, Chicago, Ill.; Frank Playter, John R. Lindburg, Frank W. Lanyon, Pittsburgh, Kan.

St. Paul, Minneapolis & Manitoba.—W. P. Clough has been appointed Assistant to the President.

Southern Ohio River.—Horace Scott has been elected President.

South Pacific Coast.—The directors of this new consolidated company in California are: E. J. Coleman, E. S. Filbury, W. G. Cohen, New York; Charles E. Stewart, V. G. Gaskill and L. B. Benchley. James G. Fair is President.

Terre Haute & Indianapolis.—This road having passed to the control of the Cincinnati, Hamilton & Dayton, a new board of directors and officers was elected this week as follows: Directors, W. R. McKean, of Terre Haute; Henry S. Ives and Christopher Meyer, of New York; C. C. Waite, F. H. Short and William M. Ramsey, of Cincinnati, and Josephus Collett, of Terre Haute. Officers, Henry S. Ives, President; C. C. Waite, Vice-President and General Manager; F. H. Short, Secretary and Treasurer; G. E. Farrington, of Terre Haute, Assistant Secretary.

Union Pacific.—Richard Anderson is appointed General Traveling Auditor, with headquarters at Omaha, Neb.; vice D. B. Hunt, promoted.

OLD AND NEW ROADS.

Arizona Mineral Belt.—The track is laid 18 miles south of Flagstaff, Ariz. Steel rails have been purchased for 65 miles of road.

Archison, Topeka & Santa Fe.—It is reported that the company is now making large purchases of real estate in Chicago for right of way, depot grounds, etc. A petition has been filed for the condemnation of certain property which could not be acquired by purchase.

It is reported that the company intends to establish a weekly line of steamships from Galveston, Tex., to Liverpool, and a tri-weekly line from Galveston to New York.

Passenger and freight traffic will begin between Galveston, Tex., and Kansas City, Mo., on June 12, via the Southern Kansas extension and the Gulf, Colorado & Santa Fe road. The run will be made in 36 hours.

It is rumored that the company has bought the St. Joseph & St. Louis road, which extends from St. Joseph to North Lexington, Mo., 76 miles.

Atlanta, Asheville & Baltimore.—The charter of this company has been turned over to Col. T. J. Powell, of New York, part of the contract being that the road is to be begun in 6 months, and finished in 5 years. The line will run from Roanoke, Va., to a point near the Cranberry mines, in Mitchell County, N. C., then to Asheville, then to Brevard, and thence to Birmingham, Ala., passing near Atlanta, Ga., which place will be reached by a branch.

Bangor & Piscataquis.—It is reported that a syndicate has been formed for the purchase of this road, which extends from Oldtown to Greenville, Me., 76 miles.

Birmingham & Atlantic.—Mason & Carpenter, contractors, have taken a contract for building 157 miles of this road, which is to run from Savannah, Ga., to Birmingham, Ala.

Birmingham & Atlantic Air Line.—The road is to be extended from Macon to Savannah, Ga. The contract will be let at once. E. H. Searcy, of Griffin, Ga., is Vice-President.

Boston, Revere Beach & Lynn.—This narrow gauge passenger road has recently added two 32 ton engines and five new passenger cars to its equipment. The latter are 60 ft. long, 8 ft. wide, and weigh 20 tons each, seating 68 persons. They were built by the Laconia Car Co., and have

Henry tilting seats, "nickeline silver" trimmings and the usual other elegancies. Mineral wool is used between the floors.

Boston & Providence.—Thirty-two suits have been brought against the company by the attorney for people injured in the Bussey bridge disaster. The damages claimed vary from \$500 to \$50,000 and the aggregate is over \$400,000.

Buffalo, New York & Philadelphia.—A survey is being made for a new belt line to connect two branches of this road in the eastern and southeastern parts of Buffalo. The new road is to be about 3 miles long.

Burlington & Missouri River.—The company is to build shops and a round-house at Holdrege, Neb.

Canadian Pacific.—The Railway Committee of the House of Commons of Canada has denied the right of this road to obtain a charter to build a line from Lachine Bridge to Dundee, Ont., to connect with the American system. The committee held that the Grand Trunk had already obtained a charter over the same route.

The company is bidding to secure the subsidy offered by the New Zealand Government for the transportation of mail matter through to England. The railroad offers to run steamers and connecting trains so that mails will reach their destination in a less time than now taken by the Oceanic Steamship Co., the present holder of the contract.

Cape Breton.—Stimms & Slater, of Ottawa, are progressing with their contract on the western half of this road between Sydney and the Grand Narrows, 44 miles. On the other half the line is being located under Hiram Donkin, Chief Resident Engineer.

Central Iowa.—A paper is being circulated and very generally signed by the first mortgage bondholders appointing Isaac Pratt, Jr., S. W. Richardson, Elijah Smith, H. W. Souter and William Pearson a committee to represent them in the matter of the foreclosure of the mortgage and purchase of the road.

Central, of Georgia.—The company will extend the Mobile & Girard road from Troy to Elba, Ala.; the Eufaula & Clayton from 25 to 30 miles, and the Fort Gaines branch from Blakely, Ga., to Columbia, Ala.

Central of New Jersey.—The Reorganization Committee, consisting of F. P. Olcott, J. Rogers Maxwell, George F. Baker, John Crosby Brown and J. Kennedy Tod, have made known their plan for the relief of the company. It provides for the issue of \$50,000,000 gold bonds running 100 years, and bearing interest at such rates as may be fixed from time to time as the bonds are issued, but not exceeding 5 per cent. These bonds are to be secured by a general mortgage covering all the property of the company, including all the securities representing the control of the constituent companies and all equipment now subject to special car trust liens. All the security of the old bonds will be preserved, while the new bonds will have the additional protection of all new property. An immediate issue of these bonds at the maximum rate of interest, and to an amount necessary to carry out the provisions of the plan, has been authorized, and the committee announced that they had formed a syndicate which would take at par and accrued interest \$12,000,000 of the bonds for a commission of 2 per cent. There will be no assessment on the stock, but the reduction in fixed charges by the lower rate of interest will bring them within the net earnings of last year. Economies of management will be secured by the consolidation of many of the constituent companies and by other reductions in expenses, while the new capital expended in improvements and extensions is expected to increase largely the gross revenues, which were less in 1886 than in 1881. Of the entire issue of \$50,000,000 there will be \$3,590,000 available for betterments.

The details of the plan provide for subscriptions by the stockholders, who may take the new bonds to the extent of 10 per cent. of their holdings. Holders of the adjustment bonds may exchange them dollar for dollar for the new bonds; the consolidated and convertible bonds at 110; the debenture bonds at 105 flat, and holders of bonds of the subsidiary companies on specified terms. The transfer books will be closed on June 15 and the privileges to subscribe to the new bonds will expire, except for foreign holders, on June 25. Some holders of securities are preparing to fight to prevent the plan of reorganization being put into effect. They hold that it will cause the bondholders to lose \$230 interest on convertible bonds in 15 years and \$180 on consols in 12 years. This will be for the benefit of the stockholders.

Charleston, Cincinnati & Chicago.—It is stated that this company has obtained control of the Carolina Midland, and work on both roads is reported to be in rapid progress. The Charleston, Cincinnati & Chicago will build a new line from Camden, S. C., to Ashland, Ky., by way of Shelby, N. C., and by purchasing other connecting roads proposes to establish a through line from Charleston, S. C., to Chicago. From Blacks, S. C., the Carolina Midland will be built to Augusta, Ga.

Chicago, Milwaukee & St. Paul.—At the annual meeting in Milwaukee last week the directory reported that it had been decided to issue 100,000 additional shares of stock with a face value of \$10,000,000, 30,000 of the shares to be used in buying the Chicago, Evanston & Lake Superior Railway, and the remainder to be used in extensions. Among the latter are several to the Northern Wisconsin mining region and from the Missouri River westward.

The company's extension of the new line to Sioux City, Ia., and Yankton, Dak., was formally opened on June 6, and two trains will now run daily each way between Chicago and the points named, using the Council Bluffs division.

The company opened its new line between Sioux City and Manilla, Ia., on June 5. By that line and the Chicago & Council Bluffs division a through route between Chicago, Sioux City and Yankton will be operated. Pullman sleeping cars being run through from Chicago to Sioux City.

Chicago & Northwestern.—The Albion extension will be completed to Oakdale, Antelope County, Neb., on June 15. It is said that the contract for the bridge over the Missouri at Sioux City has not been let.

Chicago, Oklawaha & Kansas City.—It is said that Walter Brown has purchased, in the interest of this company, the Parkville & Grand River road, which property consists of charters for elevated roads near Wyandotte, Kan., a bridge across the Missouri River at Quindaro, Kan., and an old roadbed extending from Quindaro to Latthrop, Mo., 37 miles of which are now graded.

Cincinnati, Hamilton & Dayton.—The company has bought the Bowling Green Railroad, which runs from Bowling Green, O., on the Cincinnati, Hamilton & Dayton, to Bowling Green, 6 miles.

Cincinnati, Indianapolis, St. Louis & Chicago.—The hearing of the suit brought by the Ohio & Mississippi to restrain this company from excluding the plaintiff from entering the Central Passenger Station in Cincinnati, which it approaches over the track of the defendant's road, was

begun this week. The plaintiff claims that the defendant's franchise to construct the depot and its approaches was granted with the provision that other roads should be permitted to use it upon paying a proportion of the cost. The defendant says its tracks will not accommodate the plaintiff and that the plaintiff could get an independent entrance by condemning property.

Consolidated Transit Co.—A charter has been granted to this Philadelphia company. It is to build an elevated road in that city. The incorporators pledge themselves to expend \$30,000,000, and the plan provides for a system of lines covering a length of about 26 miles.

Denver, Garden City & Southeastern.—The company has obtained a charter in Kansas for a road to extend from some point in Meade, Gray or Haskell counties through Garden City and the counties of Meade, Gray, Haskell, Finney, Kearney, Scott, Wichita, Greeley and Hamilton to the west line of the state of Kansas. Capital stock, \$2,000,000. Principal office, Garden City, Kan.

Denver Junction, McAllister & Southeastern.—The company has obtained a charter in Kansas and proposes to build a road from Denver Junction, Weld County, Col., to Garden City, Finney County, Kan., with a branch from some point on the main line in Logan County, eastward to the City of Russell, Kan. Estimated length, 350 miles. Principal office, Topeka, Kan. Capital stock, \$3,500,000.

Denver, Memphis & Atlantic.—The Fitzgerald & Mallory Construction Co. reports 122.79 miles of new track laid on this road since Jan. 1 as follows: Chetopa Division.—From the west line of Chautauqua County, Kan., to a point 2.70 miles west of Dexter, stations opened Flint and Dexter, 18.04 miles. Also from a point 2 miles east of Belle Plaine, eastward through Oxford and Winfield, 28.78 miles. Conway Springs Division.—From a point 1/2 mile north of Turon, northwesterly through Neola and Stafford, 17.71 miles. Western Division.—From the east line of Ness County, westward 35.7 miles. Iuka Division.—From a point 2.3 miles west of Iuka Junction, westward to the west line of Iuka Township, 22.63 miles. Stations opened, Silverton, Carmi and Iuka, the county seat of Pratt County.

The first regular passenger train was put on between Winfield and Stafford, Kan., on May 30. The road will be completed from Chetopa to Stafford on June 10, and from Stafford to Larned on July 1.

Drummond & Phillipsburg.—This road, which is projected to run from Drummond to Phillipsburg, Montana, 25 miles, is graded for 10 miles, and work is in constant progress. Trains will probably be running in July.

Fall River, Howard & Western.—Incorporated in Kansas. The proposed line will extend from Fall River, Greenwood County, to Winfield, about 100 miles. Capital stock, \$1,500,000. Headquarters, Howard, Kan.

Fitchburg.—The company has established through passenger service from Boston to Saratoga, N. Y., via the Boston, Hoosac Tunnel & Western. Travelers can leave Boston at 8.30 a. m. and go directly to Saratoga, arriving there at 3.30 p. m.

Fort Smith, Howard & Northwestern.—Incorporated in Kansas. The company proposes to build a road from Fort Smith, Ark., to Salina, Kan., 500 miles. Capital stock, \$7,500,000.

Fort Smith, Paris & Dardanelle.—The survey of this line between Fort Smith and Dardanelle, Ark., 80 miles, is completed, all right of way is secured, and several contracts for grading and ties are let.

Fort Worth & Denver City.—The track is laid to a point some 50 miles north of Quanah, Tex., 8 miles north of Red River and 240 miles from Fort Worth. There are 450 miles to build in order to complete the line from Fort Worth to Denver.

Gainesville, Tallahassee & Western.—The survey of this road from Tallahassee to Gainesville, Fla., was completed on June 4.

Garden City Nickel Plated.—The company has obtained a charter in Kansas for a road to run from a point in Ness or Lane County in a southwesterly direction through Garden City and the counties of Ness, Lane, Garfield, Finney, Kearney, Grant, Stanton, Morton, Stevens, Haskell and Seward to the south or west state line of Kansas. Capital stock, \$3,500,000.

Harrisburg & New England.—A petition for injunction presented by this company, which claims to be the successor of the Pennsylvania, Poughkeepsie & New England, has been dismissed. The petition sought to restrain the Slate Valley Railroad Co. from building a line which the plaintiffs claimed crossed their previously surveyed line at grade and often actually occupied this line. The plaintiff's line was the one which was to use the Poughkeepsie bridge over the Hudson, but the building of the road has been delayed for years, and in the meantime the Slate Valley people have built their road and have already secured many contracts from slate quarries.

Havana, Vermont & Western.—Articles of incorporation filed in Illinois for a road to run from Havana to Vermont, in Fulton County, thence to Quincy, with a branch from Vermont to the Mississippi River, in Hancock County. Capital stock, \$250,000.

Hickory Valley.—Incorporated in Pennsylvania to build a road from West Hickory to Camp Run, Forest County, 5 miles; capital, \$50,000.

Idaho Central.—The line is surveyed from Wampa to Boise, Idaho, 18 1/2 miles. The contract for building is let, and the road will be completed by July 1.

Intercolonial.—M. Kamper, representing German capitalists, has made an offer to the Dominion government for the purchase of this railroad, which extends from Point Levis, opposite Quebec, to Eastern Nova Scotia, 800 miles. The syndicate is endeavoring to secure a monopoly of the iron industry of Canada. It has already secured the richest iron district in Nova Scotia, and if the government will guarantee to maintain its new protective duties, will erect smelting furnaces at Pictou and import skilled hands from Germany to work them. Montreal will be the headquarters of the syndicate. The government will consider the offer.

Kansas Central.—L. T. Smith, of Leavenworth, Kan., has brought suit for the appointment of a receiver for this road, which is a Union Pacific branch, and lately defaulted on interest.

Kansas City, Memphis & Birmingham.—Tracklaying was commenced on this road at Cordova, Ala., on May 23, and at Tupelo, Miss., on June 4. Trains are expected to be running from Tupelo to Birmingham, Ala., in October.

Little Rock, Mississippi River & Texas.—Arrangements are concluded for the completion of this road from Warren to Camden, Ark., 53 miles, and work will begin at once.

Louisville & Nashville.—The company has applied to the New York Stock Exchange to list \$1,350,000 first mortgage 5 per cent. 50-year gold bonds, to cover the cost of extending the Cumberland Valley branch from Corbin, Ky., to Riverville, about 32 miles, and also the cost of completing the Indiana, Alabama & Texas road, 54 miles.

Manchester & Lawrence.—It is reported that a bill will be introduced in the New Hampshire Legislature providing for the taking of this road and the Concord Railroad by the state, under the powers retained in the charters, and for the formation of a new corporation, to be called the New Hampshire Railroad, to which the same is to be sold at a price which will give the state \$1,000,000 profit. It is said that the new corporation is to be formed with a capital limited to the estimated cost of the properties it is proposed to acquire, the dividend to be limited to 7 per cent. The stock is to be open to general popular subscription, and the new corporation is to be obliged to take all existing roads in the state and to build within a reasonable time certain needed links.

Manhattan.—The New York Rapid Transit Commission has adopted plans for the proposed new West and South street lines of this road. The average height of the track from the street will be 23 ft. The structure will be connected with all the ferries by bridges 14 ft. above the street. From South Ferry to Coenties Slip four tracks will be allowed. There will be four tracks in Battery Park. The loop will occupy a section of the park about 260 by 50 ft.

McPherson, Texas & Gulf.—Incorporated in Kansas for the purpose of constructing a road from a connection with the Union Pacific at McPherson, south through the counties of McPherson, Reno, Harvey, Sedgwick, Kingman and Harper. Length of road, 110 miles. Capital stock, \$1,320,000. Principal office, McPherson, Kan.

Metropolitan Underground of Philadelphia.—It is stated that operations on this road in Philadelphia will be commenced by next September. The necessary funds for completing the first section of the road are said to have already been subscribed.

Mexican Central.—Contracts have recently been awarded for grading 50 miles of the Tampico branch. Tracklaying on the Guadalajara branch is progressing rapidly.

A road is projected from Jimenez on this line to the Valfeza mining district, about 150 miles.

Midland, McPherson & Northern.—A charter has been obtained in Kansas for a road of this name to run from Burrton, Harvey County, northeastward through the counties of Harvey, McPherson, Ellsworth, Lincoln, Mitchell, Saline, Ottawa, Cloud and Republic, to a point on the Burlington & Missouri River road, at or near the town of Warwick. Estimated length of road, 130 miles. Office, Wichita, Kan. Capital stock, \$5,000,000.

Midland & Western.—The company has obtained a charter in Kansas to build a road from some point in Lake or Burrton township, Harvey County, on the Kansas Midland road, running thence through the counties of Reno, Stafford, Burrton, Rush, Pawnee, Edwards, Barton, Hogenan, Ness, Garfield, Lane, Scott, Finney, Kearney, Wichita and Greeley to the county seat of Greeley County, with a branch to Oak City. Estimated length, 400 miles. Capital stock, \$5,000,000. Office, Wichita, Kan.

Milwaukee, Lake Shore & Western.—The company is making arrangements for building a line from Wausau to Lacrosse, Wis., about 160 miles. Surveyors are now in the field. It is expected to have the new line completed before April 1, 1888. Construction work will begin early in the fall.

Minneapolis & St. Louis.—Vice President Truesdale has represented to the Railroad Commissioners of Minnesota that his road is unable to compete with the Chicago, Milwaukee & St. Paul, and that the Burlington & Northern had made a 7 cent rate on flour, so that the road is unable to do any through business. The freight trains to the east are mainly made up of empty cars, for which is paid three-quarters of a cent mileage in returning to the eastern roads.

Missouri Pacific.—Work is in progress on the Fort Smith & Southern, which is the New Orleans branch of the Missouri Pacific. The right of way is secured 45 miles out from Fort Smith. It is thought that the company's intention is to extend the line to Gordon, Ark., on the St. Louis, Iron Mountain & Southern, and eventually continue it down the valley of the Ouachita to Natchez or New Orleans.

Mobile & Birmingham.—Contracts have been let for building the road from Brierfield, Ala., to Birmingham, about 35 miles, and it is expected to have the entire line from the latter city to Mobile running before 1888.

Mobile & Ohio.—The company has a line to be surveyed and located between Corinth, Miss., and Birmingham, Ala., 150 miles. Five to ten mile sections will be let to contractors as soon as the engineers can furnish the profile.

Montgomery & Florida.—The road is completed 50 miles south from Montgomery, Ala.

New Road.—The Manitoba Government is inviting tenders for the construction of a road from Winnipeg to the United States boundary.

New York & Boston Rapid Transit Co.—The promoters of the air line road project between New York and Boston appear to be working with considerable earnestness. About 100 property owners in New York have been notified of the company's intention to condemn right of way down to 59th street.

New York & Greenwood Lake.—A short spur of track has been built from this road at a point about half a mile west of the Hackensack River, N. J., across the meadows to the Newark and Paterson branch of the New York, Lake Erie & Western.

New York, New Haven & Hartford.—The Railroad Commissioners of Connecticut have decided to authorize the running over this road of the Sunday newspaper trains between New York and Springfield, and have also authorized some special freight trains on the New York & New England road.

New York, Providence & Boston.—The investigation committee appointed in December, 1885, to examine for the stockholders into the affairs and condition of the property of this railroad company and the Providence & Stonington Steamship Co., has presented a report, showing the management to be good and the property in excellent shape.

New York, Wheeling, St. Louis & Chicago.—A certificate of consolidation was recorded in Springfield, Ill., this week by the New York, Wheeling, St. Louis & Ohio and the New York, Wheeling, St. Louis & Chicago companies for the purpose of forming one corporation for the operation of a road from Wheeling, W. Va., to East

St. Louis, Ill., and from Lancaster, O., to Fort Wayne, Ind., under the name of the New York, Wheeling, St. Louis & Chicago. Capital stock, \$14,000,000.

Northern Pacific.—The Cascade Division was completed in Washington Territory on June 1. Trains are now running by way of the switchback.

Ohio & Mississippi.—The company is asking for bids for 500 new box, 300 flat and 100 stock cars. The contract will be awarded about June 15.

Oxford & Kansas.—Articles of incorporation filed in Nebraska for the construction of a line from Oxford to the Kansas line and a branch up the Sappa Creek. The line is now under construction, and is being built by the Chicago, Burlington & Quincy. It will extend southwest through Kansas, and possibly go to Pueblo or Colorado Springs, Col. Capital stock of new company, \$1,700,000.

Pacific.—The United States Commission held its last session in Boston on June 4. It will meet again in Omaha, Neb., on June 20, and expects to be in San Francisco by Aug. 1.

Pekin & Danville.—Articles of incorporation filed in Illinois for a company to build a road from Pekin through Tazewell, McLean, De Witt, Piatt, Champaign and Vermillion counties to a point on the eastern boundary of the state, where the Indiana, Bloomington & Western crosses the line. Capital stock, \$3,825,000.

Pennsylvania.—The company is to build a branch from Manumusk Station, on the New Jersey road, to the oyster beds at the mouth of the Maurice River. The contract will be let at once and the road is to be finished in 60 days.

The company has bought several acres of ground at Camden, N. J., and will this month begin to erect machine, car and blacksmith shops for the Amboy division and the Camden & Atlantic and West Jersey roads. The shops will be fitted with new machinery and several hundred workmen will be employed.

Penobscot Central.—It is now said that this line from Bangor, Me., to Moosehead Lake will not be built this year, owing to so many conflicting interests desiring the Central, the leaders being the Maine Central, the Bangor & Piscataquis railroad companies and the Katahdin Iron Works.

Philadelphia & Reading.—The petition of the receivers asking authority to make arrangements with the reorganization trustees, so that moneys in the hands of the trustees may be applied to taking up \$2,000,000 of 6 per cent. and \$834,671.16 of 4 per cent. outstanding receiver's certificates, has been approved in the United States Circuit Court at Philadelphia.

It is rumored that the Receivership of this company will terminate about November. The Receivers will begin to pay the interest on the consolidated mortgage by June 30.

Pittsburgh & Western.—This road, with one of its leased lines, the Pittsburgh, Bradford & Buffalo, was sold to the Reorganization Committee for \$1,000,000 at Pittsburgh, Pa., on June 8. The committee is composed of J. Lowber Welsh, John B. Terry, Thomas H. Costie and Anthony J. Thomas, of New York and Philadelphia. The sale was made on the suit of this Mercantile Trust Co., of New York, at whose instance the property was placed in the hands of a Receiver several years ago. The Pittsburgh & Western extends from Allegheny to New Castle, Pa., 63.90 miles, and from Calvary Junction to Mt. Jewett, Pa., 137 miles, with branches of 10 miles. The company leases the Pittsburgh, Cleveland & Toledo, 77 miles, and operates a total length of line of 315 miles.

Pittsburgh, Fort Scott & Chicago.—Incorporated in Kansas. The proposed road is to extend from Pittsburgh, Kan., to Marshall, Mo., about 160 miles. Capital stock, \$3,000,000.

Rocky Forks & Cooke City.—The Council of Crow Indians has decided to grant the right of way to this road through the reservation in Montana to the coal mines at Rocky Forks and the silver mines at Cooke City. The Interior Department will appoint a commission to award damages.

St. Louis, Alton & Terre Haute.—At the annual meeting held recently, the stockholders ratified the lease of the St. Louis & Southern; also authorized agreements looking to the extension of the line to Paducah, Ky., and the lease of the Chicago, St. Louis & Paducah, which road is to be built from Marion to Paducah. Marion is the terminus of the St. Louis & Southern. Thus the St. Louis, Alton & Terre Haute will obtain through connection from St. Louis to Paducah.

St. Louis, Alton & Springfield.—Articles of incorporation have been filed in Illinois. It is proposed to construct a road from East St. Louis, Ill., to a point on the line of the St. Louis & Central Illinois, between Elmhurst or Jersey Landing and Jerseyville, thence along the line of the St. Louis & Central Illinois to Bates, in Sangamon County, and thence to the city of Springfield. Capital stock, \$1,500,000.

St. Louis, Arkansas & Texas.—Britton & Lyon, of Sherman, Tex., have been awarded the contract for building this road from Commerce to Fort Worth, 100 miles.

St. Paul, Glenwood & Hay River.—Articles of incorporation filed in Wisconsin. The object is to construct a 40-mile road from Woodville, St. Croix County, to Prairie Farm, Barron County, thus connecting converging lines of the Chicago, St. Paul, Minneapolis & Omaha road. Capital stock, \$200,000.

San Antonio & Aransas Pass.—The main line is completed to the Colorado River, 150 miles east of San Antonio, Tex. Only 24 miles of track have to be laid to connect with the Gulf, Colorado & Santa Fe at Wallace.

Shell Beach.—This road has just been completed from New Orleans to Point-a-la-Hache, La., 30 miles.

South Pacific Coast.—Articles of incorporation have been filed in California for the consolidation of all the lines owned by James G. Fair. These are the South Pacific Coast, 55 miles; Bay & Coast, 20 miles; Oakland township, 10 miles; San Francisco & Colorado River, 4 miles; Felton & Pescadero, 9 miles; Santa Cruz & Felton, 8 miles; Almaden Branch, 10 miles. Total length of lines, 116 miles. Capital stock, \$6,000,000, divided into 60,000 shares of \$100 each. Senator Fair holds 44,934 shares.

Southern Ohio River.—The grading of the road is completed from Aurora to Rising Sun, Ind., and the ties are now being laid.

Southern Pacific.—The company has laid 9 miles of track from Ventura towards Santa Barbara, Cal. Grading is being continued to Point Rincon, 15 miles from Santa Barbara.

Surveys are completed for extending this road from Santa Ana to San Diego, Cal., and work will soon be commenced.

Terre Haute & Indianapolis.—This road, which, together with the St. Louis, Vandalia & Terre Haute, constitutes the "Vandalia Line," used by the Pennsylvania party by sale of a majority of the stock, and, it is reported, will be operated in connection with the Cincinnati, Hamilton & Dayton, now controlled by the same parties. The Terre Haute & Logansport is leased by this road also.

Toledo, Ann Arbor & North Michigan.—Work has begun on the extension of the road from Mount Pleasant to Cadillac, Mich., 55 miles. Trains are expected to be running about Nov. 1.

Toledo, St. Louis & Kansas City.—On June 26, the Eastern Division of this road will be changed from narrow to standard gauge. This division extends from Toledo, O., to Frankfort, Ind., 187 miles.

Union Pacific.—The company has placed 1,000-mile tickets on sale at \$25, good on lines in Nebraska.

Vicksburg & Meridian.—The company's proposed reorganization plan has been published. The new company will issue \$2,800,000 consolidated 5 per cent. bonds, of which \$1,000,000 will be reserved for the first mortgage, \$1,000,000 to take up the second mortgage bonds with interest, \$392,000 for the company's use, and \$192,000 for an assessment of 10 per cent. upon the income bonds, which will receive \$1,844,000 preferred and \$576,000 common stock. The present preferred stockholders will receive \$964,000 new preferred stock, or one share for two, and the common stock \$1,320,000 new common stock, or one share for three.

Wabash.—Solon Humphreys and E. D. Morgan, Trustees of the New York Car and Car Trust Co., have commenced suit for \$2,000,000 for rental of rolling stock and equipment. The suit is the same as that begun recently in St. Louis.

Wabash, St. Louis & Pacific.—Special Master Allen has decided that the compensation due Receivers Tutt and Humphreys is \$112,500 each for their services, from May 29, 1883, until Dec. 1, 1887. In his report, Mr. Allen says: "I deem it worthy of comment that no party interested in this litigation has called in question, before me, a single item of either one of the eleven quarterly reports filed by the receivers regarding their receipts and disbursements, aggregating nearly \$60,000,000."

The Purchasing Committee has announced that it will protest against the fees allowed the receivers.

Zanesville & Ohio.—The road is graded to Windsor, Ohio, 10 miles south of Malta. In one month it is expected that trains will be running between Zanesville and Windsor, 37 miles.

TRAFFIC AND EARNINGS.

Coal.

Coal tonnages for the week ending June 4 are reported as follows:

	1887.	1886.	Inc. or Dec.	P. c.
Anthracite	534,901	482,651	I. 52,250	10.8
Bituminous	291,081	180,075	I. 105,006	58.4
Coke (May 28)	14,161	74,849	D. 60,688	81.0

Cumberland coal shipments for the week ending June 4 were 58,456 tons, and for the year to that date 1,305,200 tons, an increase of 77,120 tons as compared with last year.

The coal tonnage of the Pennsylvania road for the week ending May 28 is reported as follows:

	Coal.	Coke.	Total.	1886.
Line of road	216,067	14,164	230,231	186,502
Year to May 28	4,219,176	1,537,995	5,757,171	4,469,433

Increase for the week 43,729 tons, or 23.4 per cent.; increase for the year 1,287,738 tons, or 28.8 per cent. The company's new form of report shows only that freight which originates on the line.

Cotton.

The cotton movement for the week ending June 3 is reported as below, in bales:

	1887.	1886.	Inc. or Dec.	P. c.
Interior markets	8,560	11,175	D. 2,666	23.0
Receipts	13,324	27,986	D. 14,662	52.3
Shipments	53,833	139,847	D. 86,008	61.5
Seaports	7,599	19,837	D. 12,238	61.6
Receipts	8,349	70,347	D. 61,998	86.1
Exports	346,018	508,255	D. 162,237	31.9

The total movement from plantations for the crop year ending June 3 was 6,309,452 bales, against 6,406,218 last year, 5,588,335 in 1884-85, and 5,613,299 in 1883-84.

Back to the Old Rates.

It is reported that the Chesapeake & Ohio has gone back to its old schedule of rates from East St. Louis, Ill., to the seaboard under pressure from the trunk lines.

Rates on Live Hogs.

The joint committee of the trunk lines has decided to reduce the rate on live hogs from 35 cents per 100 pounds to 30 cents, Chicago to New York. To Boston the rate will be the same as to New York, and to other seaboard cities the usual difference will prevail, namely, two cents per 100 pounds less to Philadelphia than to New York and three cents less to Baltimore.

East-bound Shipments.

The total shipments of all freight except live stock from Chicago through to seaboard points during the last week amounted to 28,991 tons, against 28,321 tons for the week previous. The percentage carried by the different roads was: Baltimore & Ohio, 12.8; Chicago & Grand Trunk, 15.5; Pittsburgh, Cincinnati & St. Louis, 7.9; Lake Shore & Michigan Southern, 18.2; Michigan Central, 13.2; New York, Chicago & St. Louis, 7.3; Pittsburgh, Fort Wayne & Chicago, 23.9; Cincinnati, Indianapolis, St. Louis & Chicago, 1.2.

The Inter-state Law on the Chicago, Burlington & Quincy.

The Chicago, Burlington & Quincy has reduced its freight rates between St. Louis and Council Bluffs. When the Inter-state law went into effect, this road, being the long route from St. Louis to Council Bluffs and Omaha, rather than sacrifice its local business, raised its through rates about 15 per cent. After two months' trial, it found this business of too much consequence to lose. The return to old rates will necessitate a reduction of many of the local rates, thus giving the patrons at the way stations the ideal relief promised by the projectors of the law. If other roads, having ten or a thousand times as much local business, will sacrifice the profits on it in like manner, the public can be expected to be happy.

Evading the Law.

The managers of railroads reaching Grand Rapids, Mich., have notified shippers of furniture, a business which at that point is very extensive, that hereafter the railroads will defray all expenses of cartage from the warehouses to the depots, of outgoing goods, and from the depots to warehouses, of goods coming in. This will be a virtual rebate of

about 2 cents per 100 lbs., but the roads naively remark that it is perfectly legal.

Rates Between the Seaboard and Missouri River Points.

Commissioner Fink sends out the following circular regarding seaboard rates from and to Missouri River points:

As the result of the negotiations between joint committee and the Western roads, joint through freight tariffs and divisions on east-bound and west-bound traffic between the seaboard and the Missouri River points have been agreed upon. Roads interested in the traffic may obtain tariffs from Vice-Chairman Blanchard, at Chicago, or from this office. These tariffs were originally intended to take effect May 19, 1887, and show divisions which vary according to the difference between the official and western classifications. It has since been agreed to put the tariffs in effect June 1, at the same through rates, but to substitute the following divisions east of Chicago and East St. Louis for the varying divisions named in said tariffs. Official classification to govern. [Cents per 100 lbs.]

From—	1.	2.	3.	4.	5.	6.
New York and Boston	70	60	49	35	30	24
Philadelphia	64	54	47	33	28	22
Baltimore	62	52	46	32	27	21

Chicago to—	1.	2.	3.	4.	5.	6.
New York	80	70	54	40	35	29
Philadelphia	70	60	49	35	30	24
Baltimore	68	58	47	33	28	22
Baltimore	67	57	46	32	27	21

On shipments via East St. Louis the regular tariff east of that point will apply as the divisions of the through rates, both east-bound and west-bound. In all cases where the above figures are used as divisions of through rates the way bills should state "rate through," and should also note that the division is a "proportion of through rate." Missouri River traffic in both directions rebilled at junction points in Illinois which are east of (but not on) the Mississippi River, will be billed to and from said junctions at the authorized percentage of the foregoing rates between New York and Chicago. For example, Peoria will be 110 per cent. of the foregoing rates between New York and Chicago, which will be 77 cents on first-class, etc. It has been agreed that rates in both directions, between intermediate points on the lines between seaboard and Mississippi River cities, shall in no case exceed the through rates named in the tariffs above referred to. On such intermediate traffic the lines east and west of Chicago and East St. Louis shall receive their local rates, except when the sum of the locals exceeds the said through rates, in which case the through rates and the divisions, as herein provided, shall apply.

The Inter-state Commission.

The Pennsylvania and the New York Central & Hudson River have filed their answers to the complaints of the Chicago, Rock Island & Pacific and the Chicago & Alton which charged them with discrimination by refusing to sell tickets over their lines upon the same terms as over the Chicago, Burlington & Quincy and other competing lines. The commission has set the hearing of the case for June 15, at Washington.

The Michigan Central has filed an answer to the complaint made by the Chicago & Grand Trunk in the matter of mileage tickets being sold to commercial travelers at a lower rate than that given to the public generally. The Michigan Central admits the sale of tickets and other facts stated by the road making the complaint. It holds that the form of ticket sold commercial travelers is in the nature of a special contract by which the company is relieved from some part of the liability subject to which it transports other passengers, and it is claimed that this limitation constitutes a sufficient reason for the discrimination in favor of commercial travelers. It is also stated that these travelers constitute a distinct class of the railroad traveling public, generally riding short distances at a time and visiting a number of places of business on the line of the road; often going from one station to another by freight trains, and altogether traveling very much more than any other class of people. They also create a large freight traffic over the roads by the sales they make at places along the line. In view of these considerations, it is contended that the provisions of the Inter-state Commerce law do not apply to mileage tickets sold commercial agents.

It is intimated that an attempt is to be made to test the constitutionality of the Inter-state Commission in the courts.

London Milk Rates.

The principal milk carriers to London are The London & Southwestern, Great Eastern, Great Western, and the London & Northwestern. These four roads deliver over 20,600,000 gallons.

The tariff of the Southwestern, which the *Railway Times* adopts as practically the same as that of the other companies, is as below:

Distances.	Can, 6 gals.	Can, 9 gals.	Can, 12 gals.	Can, 15 gals.	Can, 18 gals.
Not exceeding 10 miles	0 6	0 7	0 8	0 9	0 10
Over 10 to 25 miles	0 7	0 8	0 9	0 10	0 11
" 25 " 40 "	0 8	0 9	0 10	0 11	0 12
" 40 " 50 "	0 9	0 11	0 12	0 13	0 14
" 50 " 75 "	0 11	0 13	0 14	0 15	0 17
" 75 " 100 "	0 12	0 14	0 15	0 16	0 18
" 100 " 125 "	0 14	0 16	0 17	0 18	0 20
" 125 " 150 "	0 16	0 18	0 19	0 20	0 22
" 150 " 175 "	0 18	0 20	0 21	0 22	0 24

It will be noticed that while in a 6 gallon can the cost for 10 miles is 1 d. per gallon, in an 18 gallon can it is but little over $\frac{1}{2}$ d., and in the larger can milk is carried between 5 and 6 times as far for 1 d. as in the smaller, and this difference in rates is constant up to the longest distance mentioned.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

Month of May:	1887.	1886.	Inc. or Dec.	P. c.
Buff. N. Y. & Phila.	207,100	213,000	D. 5,900	2.7
Buff. Roch. & Pitts.	192,353	77,931	I. 114,722	147.8
Can. Pacif.	923,000	804,000	I. 119,000	14.5
Chic. & Atl.	145,228	111,467	I. 33,761	30.3
Chic. & East Ill.	154,835	114,516	I. 40,319	35.2
Chic. Mil. & St. P.	1,866,000	1,767,068	I. 98,932	5.5
Chic. & W. Mich.	116,493	107,168	I. 9,325	8.6
Chic. St. L. & Pitts.	410,336	358,696	I. 51,660	14.4
Carl. Vin. & Chic.	60,880	55,530	I. 5,350	9.6
Louis. N. A. & Chic.	177,570	131,895	I. 45,675	34.6
Louis. E. & St. L.	79,948	62,639	I. 17,289	27.5
Long Island	754,306	229,067	I. 25,309	11.0
Wheeling & L. Erie.	75,174	46,855	I. 28,319	60.9
St. L. Ark. & Tex.	162,070	108,401	I. 53,669	49.5
St. Paul & Duluth	100,096	116,650	I. 13,386	11.4
St. Joe & Grd. Isd.	76,910	80,408	D. 12,498	13.9
St. Louis & San Fran.	443,760	364,200	I. 79,560	21.8
Tol. A. A. & N. M.	34,048	24,857	I. 9,191	36.8
Tol. & Ohio Cent.	71,322	71,322	I. 0	0.0
Wheeling & L. Erie.	56,339	15,177	I. 41,162	271.5
Wabash (West)	484,170	418,763	I. 65,407	15.6
Total	\$6,124,370	\$5,314,375	I. \$809,995	15.2

Month of April:	1887.	1886.	Inc. or Dec.	P. c.
Allegheny Valley	163,606	148,391	I. 15,215	12.5
Net	63,343	57,609	I. 5,734	9.9
Balto. & Potomac	115,711	109,821	I. 5,890	5.3
Net	30,550	36,840	D. 6,290	16.3
Cal. Southern	132,461	60,505	I. 71,956	118.9
Net	2,030	2,030	I. 0	0.0
Canadian Pac.	850,399	835,542	I. 14,857	1.8
Net	232,456	337,702	D. 105,246	35.3
Grand Rapids & Ind.	234,742	188,982	I. 45,760	24.2
Net	74,926	56,683	I. 18,243	30.4
Louis. & Nash.	1,178,320	967,740	I. 210,580	21.7
Net	385,158	313,925	I. 71,233	22.6
Louis. N. O. & T. P.	124,942	99,149	I. 25,793	26.0
Net	12,444	6,877	I. 5,567	80.8
Memphis & Char.	117,233	86,287	I. 30,946	35.8
Net	18,244	37,479	D. 19,235	51.3
Minn. & N. West	77,929	31,267	I. 46,662	149.0
Net	10,342	11,586	D. 1,244	10.7
N. Y. Ont. & West	118,268	97,611	I. 20,657	21.1
Net	15,435	9,328	I. 6,107	65.6
Norfolk & Western	322,691	267,559	I. 55,132	20.6
Net	124,233	109,390	I. 14,843	13.5
Northern Central	513,600	411,397	I. 102,203	24.8
Net	227,987	140,641	I. 87,346	62.1
Northern Pacific	1,121,006	963,484	I. 157,522	12.8
Net	539,643	484,744	I. 54,899	11.3
Ohio & Miss.	300,294	270,198	I. 30,096	12.2
Net	98,764	58,870	I. 39,894	67.7
Shenandoah Valley	65,088	53,654	I. 11,434	21.2
Net	6,291	3,633	I. 2,658	81.5
St. Jos. & Grd. Island	76,331	80,415	D. 4,084	15.5
Net	17,592	42,913	D. 25,321	59.0
Union Pacific	2,342,155	2,065,434	I. 276,721	13.3
Net	846,350	217,515	I. 628,835	3.4
Total gross	7,854,796	6,787,436	I. 1,067,360	15.7
Total net	2,765,887	2,548,557	I. 217,330	8.5

Month of March:

	1887.	1886.	Inc. or Dec.	P. c.
Charles. & Sav.	48,599	49,116	D. 517	...
Chic. St. P. M. & O.	580,151	521,047	I. 59,104	11.3
Cin. Ind. St. L. & C.	234,712	228,209	I. 6,503	2.8
Net	97,576	93,519	I. 4,057	4.3
Danbury & Nor. Ind.	17,510	16,966	I. 544	3.2
Gr. Bay. W. & St. P.	45,256	28,230	I. 17,026	60.3
L. Rock & Ft. Smith.	67,463	49,517	I. 17,946	36.2
Minn. & St. Louis	162,071	142,712	I. 19,359	13.5
North Eastern (S. C.)	55,594	60,009	D. 4,415	7.3
Port Royal & Aug.	43,058	46,467	D. 3,409	7.8
Port Royal & W. C.	30,904	23,017	I. 7,887	34.2
Sciota Valley	67,111	58,729	I. 8,382	14.2
Spar. U. & Col.	5,445	9,692	D. 4,247	43.4
Total gross	1,358,314	1,234,381	I. 123,933	10.0

Two Months, April 1 to May 30:

	1887.	1886.	Inc. or Dec.	P. c.
Cour D'Alene	27,839
Net	18,044

Three months, Jan. 1 to March 31:

	1887.	1886.		
Boston H. T. & W.	\$166,199	\$134,676	I.	\$31,523
Net	39,475	26,639	I.	12,836
Brooklyn Elevated.	154,048	124,455	I.	29,593
Net	53,112	28,519	I.	24,593
Del., Lack. & West.	1,389,569	1,166,900	I.	222,579
Net	741,548	619,002	I.	122,546
Manhattan Elevated	1,911,790	1,760,096	I.	151,694
Net	771,770	825,329	D.	53,559
N. Y. L. E. & West.	5,412,655	4,876,310	I.	536,345
Net	1,497,885	1,245,581	I.	252,304
N. Y. & N. Eng.	950,087	851,190	I.	98,897
Net	278,786	288,788	D.	10,002
N. Y., Chic. & St. L.	1,271,792	948,163	I.	323,629
Net	466,358	334,453	I.	131,905
Or. & Mississippi	396,704	388,308	I.	8,396
Net	326,704	203,839	I.	122,865
Ore Ry. & Nav. Co.	972,202	661,200	I.	310,942
Net	321,955	278,335	I.	43,620
Pennsylvania.	12,250,992	10,872,866	I.	1,378,126
Net	4,030,449	3,524,525	I.	505,924
Phia. & Erie	843,849	742,490	I.	101,359
Net	331,845	311,841	I.	20,004
Phila. & Read	4,848,061	4,039,302	I.	808,759
Net	2,377,749	1,464,786	I.	912,963
Coal & Iron Co.	3,439,350	2,722,512	I.	716,838
Net	1,741,471	1,486,259	I.	255,212
Rome, W. & Orden.	641,270	588,756	I.	52,514
Net	218,551	215,956	I.	2,595
St. Joe & Grd. Island.	302,447	278,847	I.	23,599
Net	130,412	121,092	I.	9,320
Shen. Valley	1,707,131	132,504	I.	53,197
Net	21,173	\$2,949	I.	24,122
So. Pac. Co.:				
Gal. H. & S. A.	698,240	578,750	I.	119,490
Net	7,998	81,597	D.	73,599
Louisa. West.	181,364	142,039	I.	39,325
Net	76,368	108,544	D.	32,176
Memph. & T.	997,554	1,065,498	D.	65,514
Net	96,770	278,021	D.	181,251
N. Y., Tex. & Mex.	31,879	29,104	I.	2,775
Net	\$8,136	\$6,879	D.	1,257
Tex. & New Orleans	266,986	215,289	I.	51,697
Net	108,300	80,835	I.	27,465
Atlantic System.	2,176,425	2,028,650	I.	147,775
Net	290,431	250,220	I.	40,211
Pacific System.	5,226,431	4,845,089	I.	381,342
Net	2,015,138	2,310,870	D.	295,732
Total So. Pac.	7,402,815	6,873,739	I.	529,116
Net	2,296,469	2,812,535	D.	516,066
Union Pacific.	5,684,632	4,890,003	I.	1,094,629
Net	1,069,730	1,436,078	I.	536,652
West Jersey & Br.	255,085	223,590	I.	31,519
Net	61,532	72,536	D.	11,006
Total (gross)	49,416,128	43,042,063	I.	6,374,065
Total (net)	16,063,084	13,329,498	I.	2,733,086